AIR CONDITIONING HEATING AND VENTILATING

DECEMBER, 1957—54th Year

Finned-Tube Radiation Serves State College Library.
See page 71

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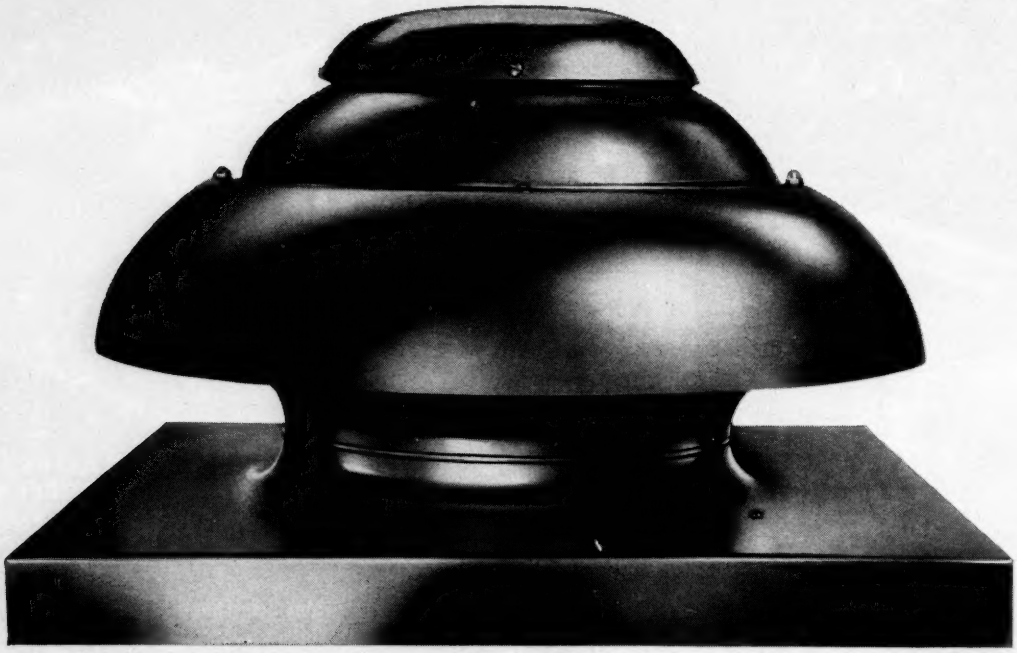

ILG Type CRF ROOF VENTILATORS provide powerful air exhaust for single or multi-story buildings. "Unitized" fan, motor and housing make installation easy. Ilg motor has permanently lubricated ball bearings—is direct-connected to backward-curved airfoil blade type centrifugal fan. Long life, minimum service, quiet operation are assured. Capacities to 25,000 CFM are certified by PFMA label.

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AIR CONDITIONING HEATING AND VENTILATING

DECEMBER, 1957

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The Cover: Finned-tube radiation system installed in new library of La Crosse State College, La Crosse, Wis. Photograph courtesy of The Trane Company.

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HIGH SPOTS

• A **solar heated house** that can be built and lived in today in New Jersey was described by Calvin D. McCracken, solar heating expert, who spoke to the North Jersey chapter of the Society of Heating and Air-conditioning Engineers. Working with architect C. Harrison Hill, Jr., he has come up with a plan for a 4-bedroom house with thirty 4 by 10 **solar heating collectors** developed by his firm, Jet-Heet, Inc., of Englewood. Collectors sell for about 40 dollars apiece. Heat storage in chemicals for a period of up to 4 or 5 days is provided for to tide over prolonged periods of cloudy weather. Initial cost of the heating system should range from 2,000 to 3,000 dollars. Annual heating bill should be near zero.

• Manufacturers will **sell $2,200,000,000 worth of industrial, commercial and residential air conditioning this year,** The New York Times reports. Of this, $700,000,000 is accounted for by residential air conditioning. Carrier, Trane, and York are listed as the big three. The Trane Company, pointing to a 233% gain in its sale of industrial refrigeration for the first eight months of 1957 as compared to 1956, sees the possibility of a long-awaited break-through for factory employee comfort cooling, the trend being similar in pattern to that in the office-building and existing-building fields some years back. Most promising areas are the South, and those electronics, precision tool, and other skilled-labor industries in the Northeast and Midwest where high wages are paid to attract and hold skilled personnel.

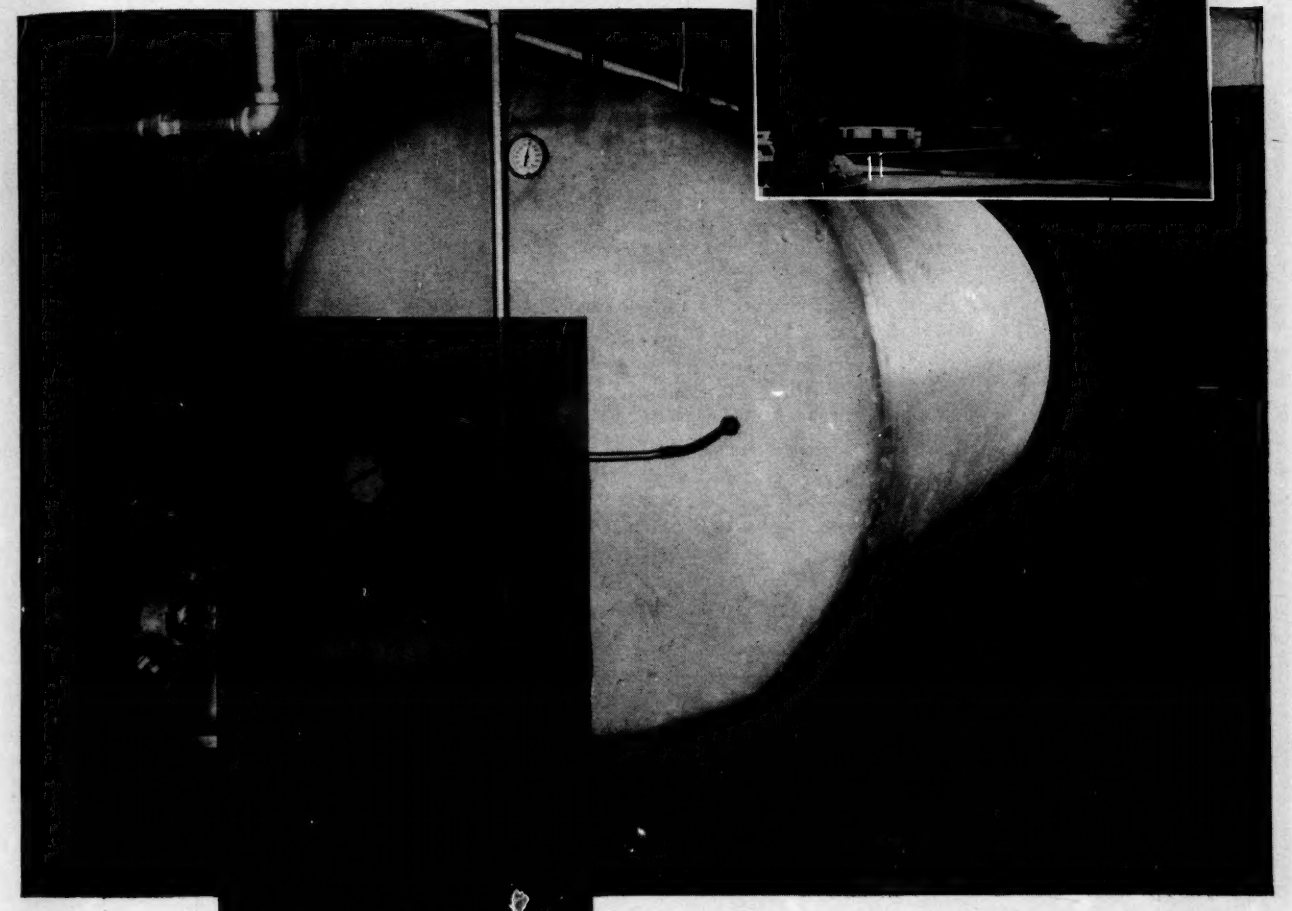
• Gains in **construction contracts** for housing and for government-owned facilities will more than offset prospective declines in contracts for industrial and commercial building in 1958, according to estimates released by the F. W. Dodge Corp., New York, N. Y. In its **annual outlook** for the construction industry, Dodge estimates that construction contracts in 1958 will total $33,830,000,000, a gain of 5% over the expected 1957 level. However, a portion of the anticipated increase will be accounted for by higher construction costs rather than additional physical volume. Contracts for non-residential buildings in 1958 are estimated at $11,570,000,000, only slightly above the 1957 level. Physical volume, however, as measured by floor area is likely to be down 2% in 1958. The spread between the floor area estimate and the expected dollar volume is based on increased costs. Residential building contracts next year are expected to total $13,760,000,000, up 8%.

• Twenty-five sessions are planned for the **Plant Maintenance & Engineering Conference** in Chicago next month. Held during the first three days of the Plant Maintenance & Engineering Show, which is scheduled for the International Ampitheatre, January 27-30, sessions will be at the Ampitheatre and the Palmer House.

• A proposal, developed by the Building Research Institute's Plumbing Research Committee, to establish a **Plumbing Engineering Council** was endorsed by the American Society of Sanitary Engineers at its fifty-first annual meeting at Fort Lauderdale, Florida. ASSE will participate in the formation of the Council. PEC objectives are to work toward the development of more and better standards, the upgrading of existing standards, and the establishment of uniform testing procedures. The proposed PEC evolved from exploratory meetings of BRI members with representatives from ASSE, the National Association of Plumbing Contractors, the Plumbing Fixtures Manufacturers Association, U. S. Public Health Service.

• The first of a series of campaign materials for the Farm Better Electricity Program is a kit of promotional and display items dealing with **farm ventilation.** Goal of the drive is a 10,000 kwhr average per farm by 1965. Originator is Edison Electric Institute, New York City. Future kits (and drives) will include farm water heating, electric brooding, crop drying, heat applications, and lighting.

This p-k copper-lined storage water heater furnishes an abundant supply of rust-free hot water in the field house at Marywood College, Scranton, Pa.

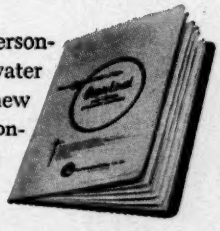


d College depends for rust-f on p-k copper-lined storage heaters

In 1949, Marywood purchased a p-k copper-lined heater shell to replace a plain steel heater in O'Reilly Hall. Failures of the old plain steel tank had made immediate replacement necessary. The success of this installation caused the college to specify p-k equipment for a new music hall, residence building, science building and field house, all part of a continuous expansion program.

You can expect such results from p-k copper-lined heaters. By combining the noncorrosive qualities of copper with the superior strength of steel, you are assured of an uninterrupted supply of rust-free hot water . . . year after year. And Patterson-Kelley copper-lined heaters are opened for inspection every two years, and require no maintenance except the removal of sediment.

To get all the facts about Patterson-Kelley copper-lined storage hot water heaters, write for your copy of the new data file No. 16 today. The Patterson-Kelley Co., Inc., 1112 Warren Street, E. Stroudsburg, Pa.



Patterson Kelley

Water Heating Division

waste water heat reclaimers • storage water heaters • condensate coolers • instantaneous heaters • steam-mizers • feed water heaters

WASHINGTON OVERTONES

by LORING F. OVERMAN

● Until further notice, sputniks will continue dominating the Washington scene.

Some Capital observers are already labeling the coming Congress a "Sputnik Congress". All legislative decisions, they infer, must be made after viewing the topics "by the light of the sputnik moon".

This goes for new subjects, as well as for those held over when Congress adjourned last August. Examples:

Revamping of the defense program is already under way—cost- and weapon-wise.

With outer space as the objective of missiles and satellites, outer space may also be the destination of the defense budget. Tip-off: the Administration has indicated "it has never considered the 38-million dollar defense budget ceiling as sacrosanct". Defense Department does not contemplate trying to propel missiles into orbits with money alone . . . hence will not insist immediately upon huge new appropriations. Conversely, neither Congress nor the public relishes present No. 2 spot. Hence those who like the "more money for defense" idea feel certain taxpayers will not flinch if they can be convinced that money will do the job.

Current thinking is that extra cost of missiles and rockets programs may be as much as $2-billion a year. At first, much will come from revising other military programs. However, when missiling and rocketry reach the production stage, requests for additional funds can be expected—and will be granted.

● Directing the nation's gaze to outer space has numerous overtones of interest to those in the air-conditioning and heating and ventilating industries:

For those supplying the military, there will be bigger and better defense orders.

Indirect effects will also be numerous:

—on the debit side, likelihood of a tax cut in 1958 is increasingly remote.

—as a credit, economists predict that increased military spending will further check the possibility of a recession in 1958.

—easing of tight money policy was indicated by Federal Reserve Board announcement that four Federal Reserve Banks would lower discount rates from 3½ to 3%.

● Federal backing of basic research encourages optimism over final outcome of USA-USSR scientific race. Restoration of national confidence will be reflected in renewed investing and spending by industry and by individuals. Examples:

Air conditioning, heating, and ventilating people may plan for a 5% increase in construction activity (dollarwise) in 1958, according to joint estimates of the U. S. Departments of Commerce and Labor. The expected dollar total, $49.6-billion, would be $2.4-billion above this year's expected $47.2-billion. The increase would involve residential and highway construction principally. Expected are 1,100,000 new dwellings in 1958, with 1,050,000 privately financed.

Residential outlook—up 8% to $18.4-billion from $17-billion—forecasts $675-million increase in new housing, $335-million increase for alterations, and $345-million increase for new public residential building.

● Construction sidelights:

—1958 promises to continue the decided uptrend in multi-family housing.

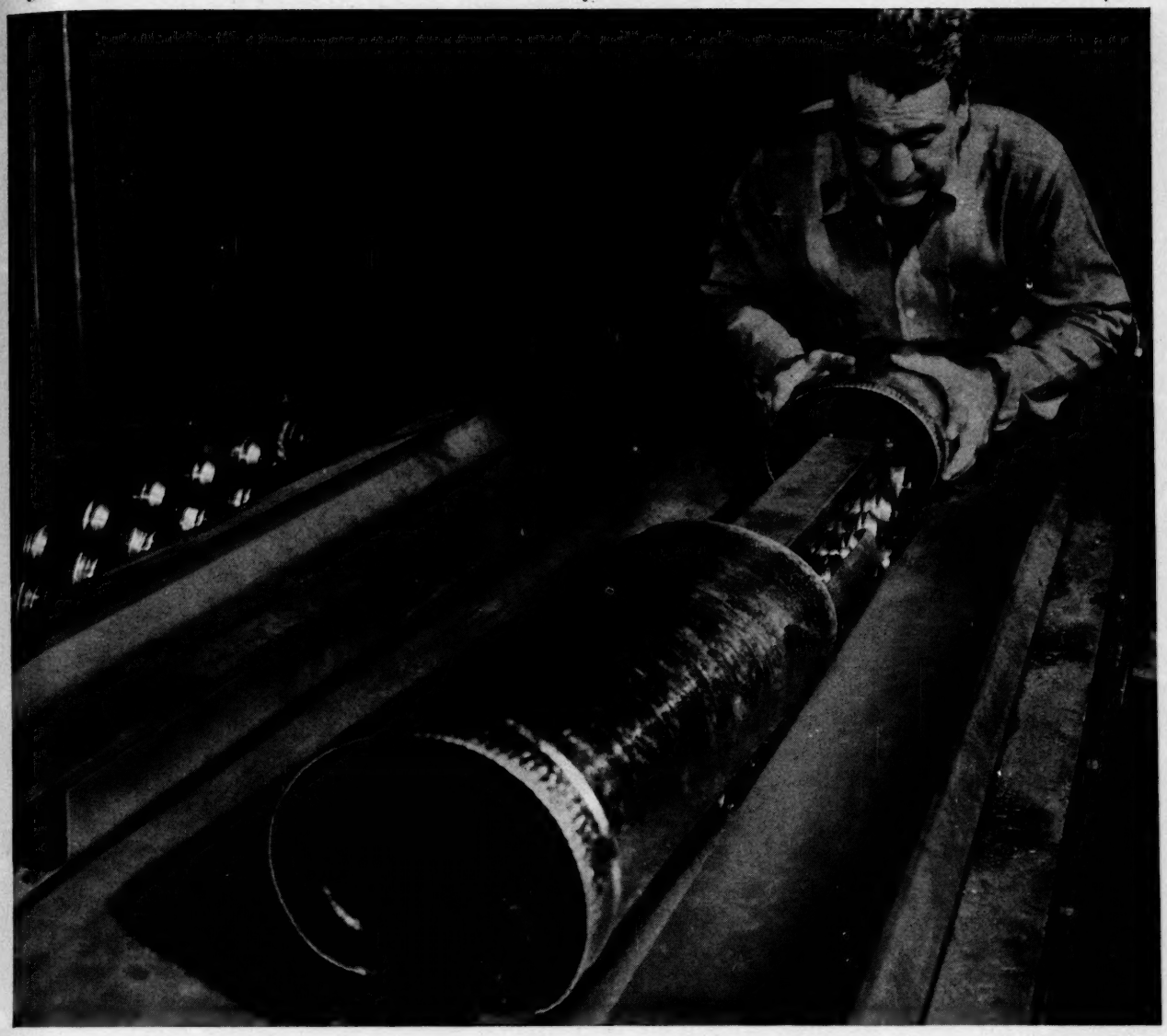
—apartment units may account for at least 20% of total housing starts in 1958; largest percentage since 1949.

—office buildings and warehouses; expect outlays slightly above $2-billion for first time.

—stores, restaurants, garages; to $1.75-billion, slightly above 1957.

—public schools; up to $3-billion, accounting for one-fifth of public expenditures of $14.9-billion.

(Continued on page 8)



Bethcon coating stays tight in the toughest forming jobs

You can make snap locks, Pittsburgh lock seams or some special seam of your own without damaging the zinc coating on a Bethcon sheet. That's because Bethcon is galvanized by a continuous process which bonds the zinc to the base metal much more tightly than conventional methods.

This same process also distributes the zinc evenly over the sheet, producing a finished sheet of uniform thickness and appearance. It also eliminates the bead usually found on the drip ends of hot-dipped sheets.

Another advantage of the Bethcon continuous galvanizing process is the remarkable combination of strength and ductility in the sheet. That's because the basic steel receives a special annealing in the continuous line. You'll find a Bethcon sheet neither too soft nor too stiff, but just right for easy workability and a sturdy end-product.

You can specify Bethcon in any gage from 13 on up, in plain steel or copper-bearing (Beth-Cu-Loy) for extra corrosion-resistance. If you have not yet worked with Bethcon, you might like to talk with someone who has. Or perhaps you'd prefer to discuss it with one of our own men. Either way, you'll get prompt attention by getting in touch with our nearest district sales office.

You really ought to try Bethcon. Why not call us now?

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

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BETHLEHEM STEEL

BETHLEHEM STEEL

WASHINGTON OVERTONES *(Continued from page 6)*

—sewers and waterworks; decline 4% and 7% respectively.
—military facilities construction; off 14% to $1.1-billion.

● For the year ended September 30, fuel consumption by utilities included:
161,701,444 tons of coal
1,327,082,419,000 cubic feet of gas
81,027,065 barrels of oil
Totals, respectively, are 3.1%, 9.8%, and 11.3% above comparable 1955-56 period.

Bureau of Mines forecast in mid-November that 7,000,000 barrels of domestic crude petroleum will be consumed or exported daily during December. Figure would be 150,000 b/d over the November market demand. December projected total would be 687,000 b/d below December of last year, when U. S. oil was being exported to Western Europe because of closing of the Suez Canal.

Oil shales in some sections of Colorado are much richer than previously believed, the Bureau of Mines has reported. Studies indicate continuous oil-shale beds in the Piceance Creek Basin, from 780 to 1,980 feet thick. A square-mile segment 1,980 feet thick would contain 2.25-billion barrels of oil. The shale assays 25 gallons of oil per ton.

Interior Department's Office of Minerals Mobilization is expanding its executive reserve program. The executive reserve project trains civilian executives to participate in government service in time of emergency. The first reserve group under Interior Department program included representatives from the solid fuels industry; bituminous coal, anthracite coal, and coke.

● Goal of one of Defense Department's programs is to eliminate the need for much of the "plumbing" required in using liquid fuels to power rockets and missiles. Complex equipment needed to utilize liquid fuels may have caused several recent failures, DOD believes.

All services are experimenting with solid fuels—somewhat lower in energy yield potential, but reportedly closing the gap.

● Of interest to every company or individual who provides or accepts remuneration of business expenses is a new Internal Revenue Service requirement. Included in income tax forms for reporting 1957 income is added question requiring substantiated information about all sums received as business expense advances or replacements.

Although aimed at the "big fellows", the new requirement will complicate income reporting for millions of others.

● How federal tax policies affect small business is the subject of a nationwide series of hearings by Senate and House committees. Senate Small Business Committee schedule included hearings in Phoenix, Birmingham, Los Angeles, San Francisco, Boston, New York, Miami and Chicago.

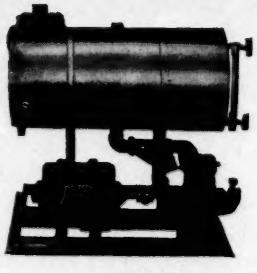
House Small Business Committee held hearings in Washington late in November. Purpose of the studies was (1) to examine anew the impact of federal taxation on small business, and (2) to acquaint the small business men of the country with the various relief measures proposed to Congress.

● Possibility of a water shortage, as population and industry expand, is a subject of study in Washington. During November, four committees attended a three-day symposium to study methods of obtaining potable water from saline water.

Symposium was sponsored by the Interior Department's Office of Saline Water and the National Academy of Sciences-National Research Council. Recommendations were filed by the Distillation Committee, the Committee on Membrane Processes, the Solar Distillation Committee, and the Committee on Freezing Processes.

Skidmore

TYPE "HS"
CONDENSATION PUMP



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"UV" TYPE

VACUUM TYPE

Economy minded Architects, Engineers and Contractors specify the Skidmore "HS" Pump—they know its "time proven" performance in handling condensate.

The Skidmore "HS" Pump is equipped with bronze fittings throughout—including bronze fitted impeller and stainless steel shaft to insure long-life and proper alignment.

Yes, the popular "HS" Condensate Pump possesses all the fine features that are found in every Skidmore Pump: Expert engineering, ruggedness, dependability, plus, economy and efficiency.

Write for Bulletin No. 14-A . . . and send us your pump problem today!

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SKIDMORE PUMPS

SKIDMORE CORPORATION
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BRIEFLY STATED

FOR THE FILES—FOLLANSBEE ENGINEERING & SUPPLY COMPANY, and its affiliate, ELECTRIC HEATING & COOLING COMPANY, have moved to 7537 N. Clark St., Chicago. The new space has a floor area of 4500 sq ft for engineering offices, city counter, and warehouse . . . Percoflash Manufacturing Company has changed its name to WESTCOTT SNYDER MANUFACTURING CORPORATION, Madison, N. J. No change of address or phone number.

WITH THE INSTITUTES AND ASSOCIATIONS—Highlighting the 1957 fall meeting of the VERTICAL TURBINE PUMP ASSOCIATION at Yosemite, Calif., was the annual election of officers. F. E. Dunn, general manager, Turbine Pump Div., Worthington Corp., was elected president for 1958; Harold Miller, general manager of Johnson Pump Div., The Youngstown Sheet and Tube Corp., is vice-president; and B. A. Tucker, retired sales manager, Peerless Pump Div., Food Machinery and Chemical Corp., was appointed to serve as the Association's manager for 1958 in addition to his duties as secretary-treasurer, a position he has held for the past year. New members of the executive committee are: G. F. Twist, Peerless vice-president; Harry E. Carloss, vice-president, The Deming Co.; J. P. Adams, vice-president, Byron Jackson Div., Borg-Warner Corp. Dan R. Rankin, Peerless chief engineer, is chairman of the technical committee . . .

Succeeding Paul R. Rutherford, who resigned, A. G. (Ted) Cochran has been named president of CLAY SEWER PIPE ASSOCIATION, INC. . . . New president of the board of directors of two-year old OCCUPATIONAL HEALTH INSTITUTE OF KENTUCKY is John M. Kane, manager of dust control products, American Air Filter Co., Inc. A non-profit organization for the advancement of health and health practices in Kentucky industry, the Institute has a mobile health unit that visits each member firm at least once a year to administer chest x-rays; vision examinations, audigram tests for early signs of hearing loss; blood pressure, weight, and height measurements; tests for anemia and diabetes, etc. . . . John H. Eiseman, gas chemistry specialist with National Bureau of Standards since 1921, was honored for his contributions to the gas industry with the service award of GAS APPLIANCE MANUFACTURERS ASSOCIATION. His work resulted in publication by the Bureau of the first authoritative technical papers on designing atmospheric burners to insure maximum safety and complete combustion.

BURGEONING BUSINESS—District headquarters for MACHINERY & SYSTEMS DIV., CARRIER CORPORATION, will move into a new office building to be constructed in Houston, Tex. . . . CLARAGE FAN COMPANY has purchased the Kalamazoo Stove Company plant, which more than doubles the company's manufacturing and warehousing space . . . THE FAIRBANKS COMPANY has opened a Chicago branch office and warehouse . . . BELL & GOSSETT COMPANY has acquired a controlling interest in the three Marble Corporations of Gladstone, Mich. They include the Marble Arms Corporation, which manufactures gun sights, gun cleaning equipment, knives, axes, etc., the Marble-Card Electric Corporation, which manufactures electric motors, generators, and other electrical equipment, and the Marble Realty Corp. . . . HEIL-QUAKER CORPORATION, Nashville, Tenn., amalgam of The Heil Co., Milwaukee, and Quaker, lately a division of Florence Stove, will produce home heating and cooling units at the Lewisburg, Tenn., Quaker plant . . .

All manufacturing components of IRON FIREMAN MANUFACTURING COMPANY's heating division will be consolidated in Cleveland this Fall with the acquisition of a third plant in the city . . . The new steel service plant of JOSEPH T. RYERSON & SON, INC., warehousing subsidiary of INLAND STEEL COMPANY, at Charlotte, N. C., replaces former leased quarters there.

It has been announced that the HAMMEL-DAHL COMPANY, Providence, R. I., has become a division of GENERAL CONTROLS COMPANY, Glendale, Calif. Hammel-Dahl's pneumatically-operated control valves will extend General's industrial valve line into the high-temperature atomic energy and chemical processing fields. Management in Providence will continue under Edward T. Dahl as president of the division, and Thomas Ponton, general manager . . . YORK DIVISION OF BORG-WARNER CORPORATION bought the Lancaster, Pa., automotive air conditioning and related manufacturing facilities of LEHIGH MANUFACTURING COMPANY, a division of LEHIGH, INC., Easton, Pa., putting York in the automotive cooling business. Lehigh announced that it is consolidating its condensing unit and compressor production at its Easton plant, promising no interruption of service during the changeover. Lafayette E. Hammond has been elected president of Lehigh. He had been chief engineer since 1948. His predecessor, Alvin A. Shumann, moves up to chairmanship of the finance committee. New vice-presidents are Leroy M. Bissett, who continues as general manager of the company's refrigeration products division, and Clayton L. Coulter, in charge of purchasing . . .

AIR FILTER CORPORATION is building a new plant and office at 4554 S. West Woolworth Ave., Milwaukee. Plant capacity will be doubled . . . Headquarters offices of RECONY CORPORATION are moving to its plant at Belle Island, Richmond, Va. Offices in New York City will be retained for sales engineering . . . Operations in Bellwood and Melrose Park, Ill., of LAKE CITY, INC., a subsidiary of CONTROLS COMPANY OF AMERICA, will be consolidated in a 20,000 sq ft manufacturing plant at Crystal Lake, Ill., expected to be completed early in 1958. In addition, a 50,000 sq ft plant at North Manchester, Ind., to be built on a 10-acre site donated by the city, will house operations of the parent company transferred from its present Spring Valley, Ill., facilities . . .

Four factory branch offices were opened by POWERS REGULATOR COMPANY. At Columbia, S. C., J. G. Slattery will be in charge. At Green Bay, Wis., Robert Tusti-

(Concluded on page 12)

WARMEST WISHES
FOR THE HOLIDAY
SEASON
WATTS REGULATOR COMPANY
ESTABLISHED 1875
MANUFACTURERS OF
Automatic · TEMPERATURE and PRESSURE REGULATING SAFETY DEVICES ·
LAWRENCE, MASSACHUSETTS U.S.A.

BRIEFLY STATED

(Concluded from page 10)

son is manager. Del Schroeder will manage the Davenport, Iowa, office; Preston R. Maxson, the Jackson, Miss., office . . . A Pioneering Laboratory, reporting to Games Slayter, Newark, research and development vice-president of OWENS-CORNING FIBERGLAS CORPORATION, will be independent of the company's Basic and Applied Research Laboratory. Rather it will concentrate on long-range projects . . . UTILITY FAN CORPORATION, a division of UTILITY APPLIANCE CORPORATION, will open a Chicago sales and service office with Marcus McGuire in charge . . .

TUBULAR PRODUCTS DIVISION, THE BABCOCK & WILCOX COMPANY, plans to expand and modernize its alloy and stainless steel-making facilities with addition of a new electric arc furnace and associated equipment, about four miles from Beaver Falls, Pa. Completion late in 1959 is forecast . . . EMERSON ELECTRIC MANUFACTURING COMPANY, St. Louis, Mo., and its subsidiary, EMERSON-PRYNE of Pomona, Calif., are setting up a combined sales organization under the latter's name, at the former's address, under the direction of Richard B. Loynd, merchandise sales manager of the parent. Regional managers are: Ben Nadorf, North Eastern area; Howard Sample, North Central; John Hayes, Central; Ralph Maynard, Southern; and Phil Pryne, Western Region . . .

THE TRANE COMPANY is breaking ground at Clarksville, Tenn., where construction of a $1½ million plant will mark the firm's entrance into production of residential units . . . STERLING, INC. announced completion of its new plant and office building in suburban Milwaukee. The 21,000 sq ft structure represents a vast expansion over the firm's former plant . . . A modern warehouse - service center, housing service, testing, warehousing, and shipping space to serve the Los Angeles area industry has been established by PACIFIC DIVISION, EUTECTIC WELDING ALLOYS COMPANY, INC., under the management of R. C. Wilcox.

NEW REPRESENTATIVES & DISTRIBUTORS— Representing A. W. CASH COMPANY: Thermal Industrial Engineering Company, Denver, for the Standard and Standard Stacon lines in Colorado . . . Representing DRAYER-HANSON DIVISION, NATIONAL-U. S. RADIATOR CORPORATION: Ray Goodwin Company, Omaha, its air conditioning and refrigeration line in Nebraska and the lower half of South Dakota . . . Sales representatives for L. J. WING MANUFACTURING COMPANY, division of AERO SUPPLY MANUFACTURING COMPANY, INC., for its line of revolving unit heaters, fans, blowers, steam turbines: Stromquist & Company, Atlanta, Ga.; Central Station Equipment Company, Tucson, Ariz. . . . Appointed distributors for STURTEVANT DIVISION, WESTINGHOUSE ELECTRIC CORPORATION, its line of industrial fans, ventilating sets, and unit heaters: The A. C. Supply Company, Philadelphia, for Delaware, New Jersey, and Eastern Pennsylvania; and McNamara Sales Company, St. Paul, Minn., for North and South Dakota, Minnesota, and northwest Wisconsin.

AMONG THE MANUFACTURERS' PERSONNEL— William L. Wearly was elected president of JOY MANUFACTURING COMPANY. He had been executive vice-president for the past two of his 20 years with the company. He succeeds John Lawrence, who resigned . . . J. Barrie Graham was promoted to director of research for BUFFALO FORGE COMPANY. He had been employed by the University of California, at Los Alamos for eight years prior to joining the company in 1953. Richard D. Madison, his predecessor, is appointed consulting engineer to the company. He is editor of four editions of *Fan Engineering* . . . New manager of the Piping Department, BUENSOD-STACEY, INC., William H. Severage will supervise estimating and designing of heating and piping installations. He came from Carrier in 1937 . . .

Named industrial air conditioning product specialist for MACHINERY AND SYSTEMS DIVISION, CARRIER CORPORATION, Ernest C. Hungate is associated with the development of the company's Rotaspray factory air conditioner. Dr. J. F. Downie Smith, elected vice-president, will head the company's Research and Development Division. Walter A. Grant, vice-president since 1953, has been designated coordinator of all development engineering activities. The latter two appointments become effective January 1. Dr. Smith has been dean of engineering of Iowa State College for the past ten years . . .

ALLIS-CHALMERS announces appointment of John L. Black as supervisor, Industrial Press Section . . . C. W. Pollock moves up from the post of chief engineer to that of manager, Air Conditioning and Refrigeration Division at DRAYER-HANSON's main plant facility . . . THE DEMING COMPANY's sales representative in Southern Florida is Kenneth M. Spear.

• After 42 years of service, MAXWELL F. RATHER retired as vice-president and Eastern district manager of JOHNSON SERVICE COMPANY. He will continue to serve as a member of the board of directors and executive committee.

• MARTENS H. ISENBERG, president and director of COMBUSTION ENGINEERING, INC., and associated with the company for 41 years, has resigned because of ill health. His successor is H. G. Ebdon.

• LYMAN COLEMAN REED, founder and chairman of the board of REED UNIT-FANS, INC. and LYMAN C. REED, INC., died at his home in Waynesville, N. C., on November 6. Mr. Reed was a pioneer and former president of Electrical Association of New Orleans, former president of Propeller Fan Manufacturers Association, and inventor and holder of many patents.

• W. C. COLEMAN, founder and chairman of the board of THE COLEMAN COMPANY, INC., died in Wichita, Kans., on November 2. He was 87. An inventor, industrialist, and lay church leader, he was best known for the gasoline lamps, lanterns, and portable stoves which made him famous. Mr. Coleman's son Sheldon succeeded him to the presidency in 1951.

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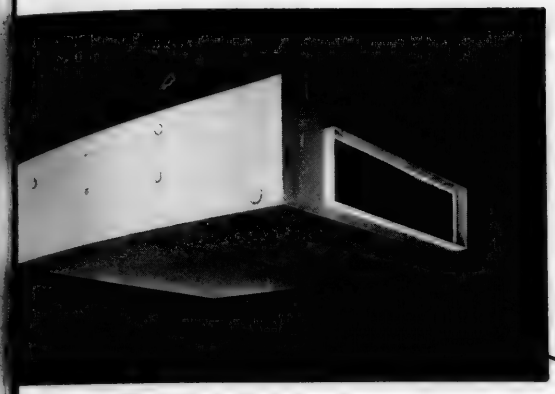
McQuay SEASONMAKERS

These McQuay Seasonmakers will furnish individual room comfort at any desired temperature level—heated, filtered air in the winter; cooled, dehumidified and filtered air in the summer—when used with a hot or chilled central water supply.

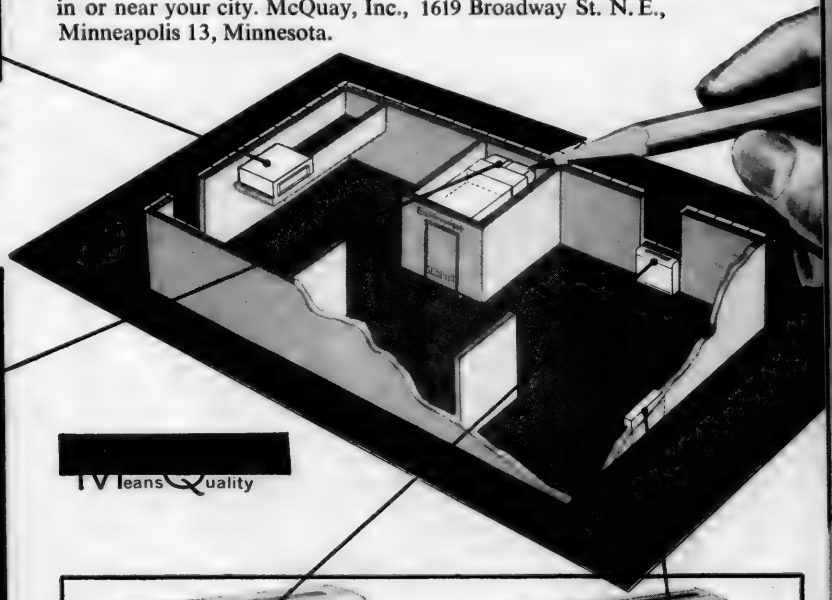
McQuay Seasonmakers are particularly designed for multi-room buildings, such as hotels, apartments, motels, hospitals, schools, offices and residences. All have the famous McQuay Ripple-Fin coils and are exceptionally quiet, handsome and built to last, with life lubricated fan motors having inherent overload protection with automatic reset. There are four types in a wide variety of sizes and capacities, each with 3 speed motor control switch.

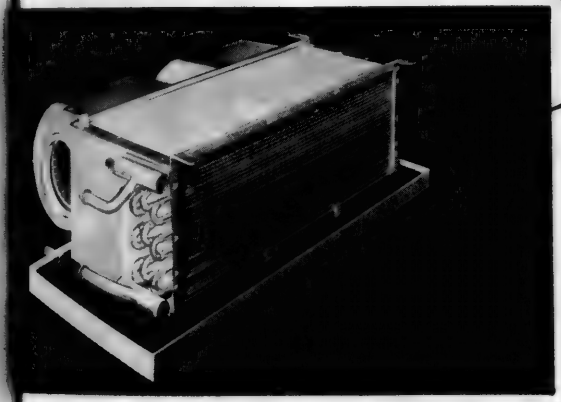
Large size Ceiling and Hideaway Seasonmakers having nominal capacities of 2, 3 and 5 tons are also now available for commercial or residential applications where a duct air distribution system is necessary. Units available for Freon applications.

Whatever your requirements may be, you'll find McQuay Seasonmakers will meet them—and do the finest possible job. For complete information and specifications, call in the McQuay representative in or near your city. McQuay, Inc., 1619 Broadway St. N. E., Minneapolis 13, Minnesota.



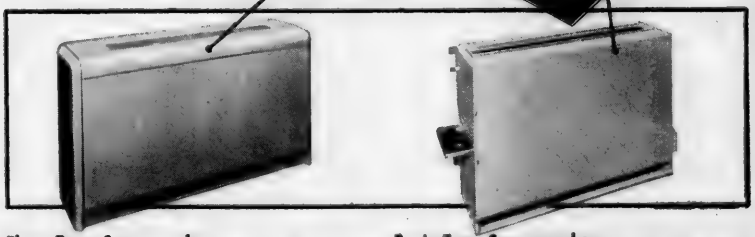
Ceiling Type Seasonmaker—for suspended mounting. 7 sizes, 200 to 2,000 c.f.m., ½ to 5-ton nominal cooling capacity. Thermally and acoustically insulated.





Hideaway Type Seasonmaker — for concealed, suspended mounting in closets, attics, or furred spaces. 7 sizes, 200 to 2,000 c.f.m., ½ to 5-ton nominal cooling capacity. Insulated drain pan.

TV Means Quality



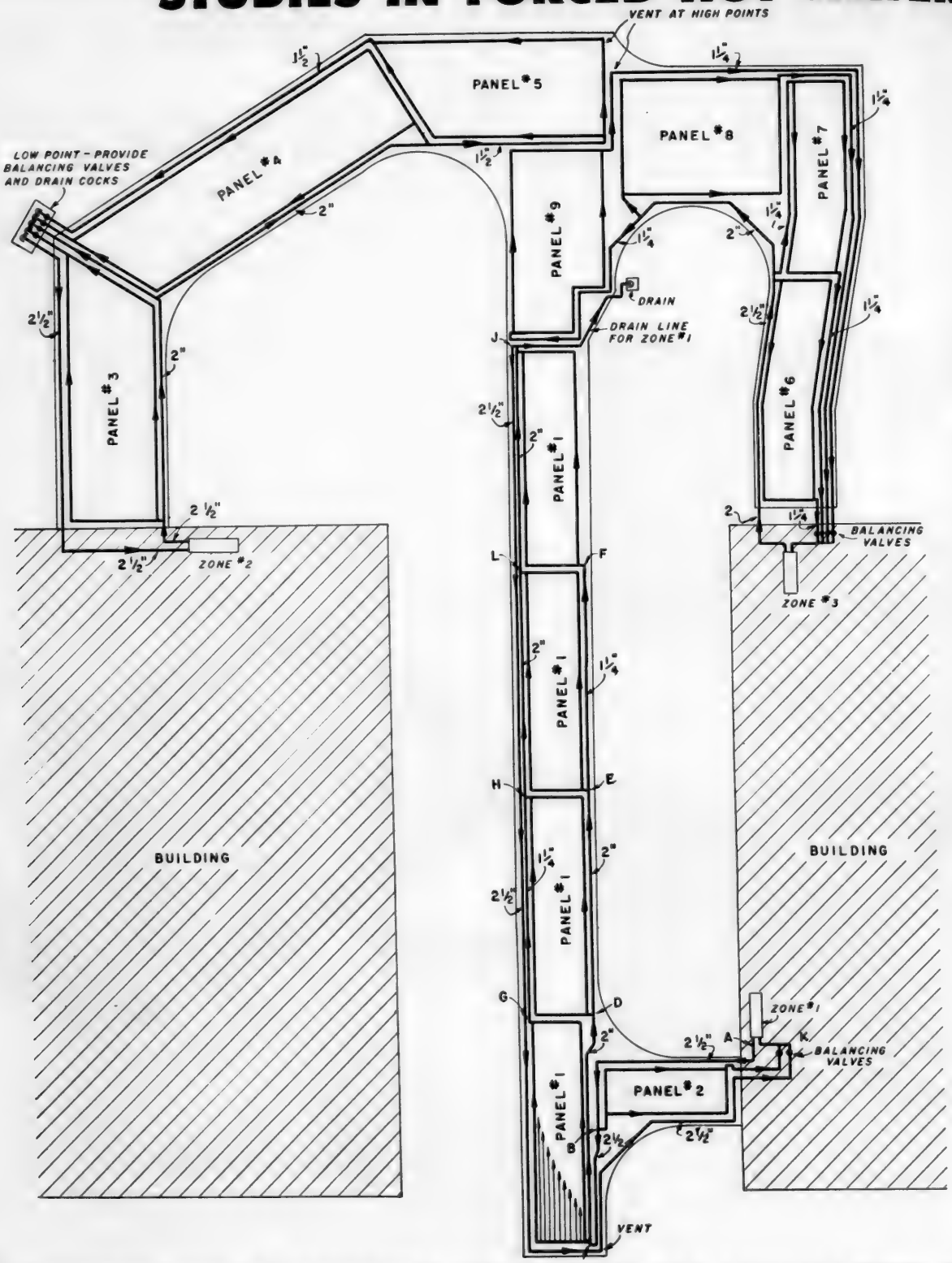
Floor Type Seasonmaker—for free standing floor mounting. 4 sizes, 200 to 600 c.f.m., ½ to 2-ton nominal cooling capacity. Thermally and acoustically insulated. Choice of 3 air discharge grilles.

Basic Type Seasonmaker—for fully recessed built-in wall installations. 4 sizes, 200 to 600 c.f.m., ½ to 2-ton nominal cooling capacity. Thermally and acoustically insulated.

McQuay INC.

AIR CONDITIONING
HEATING
REFRIGERATION

STUDIES IN FORCED HOT WATER



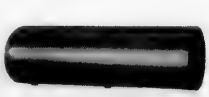
A COMPLETE LINE OF EQUIPMENT FOR HEATING AND COOLING WITH WATER

Monoflo Fittings

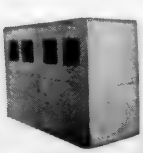
Relief and Reducing Valves

Water Heaters

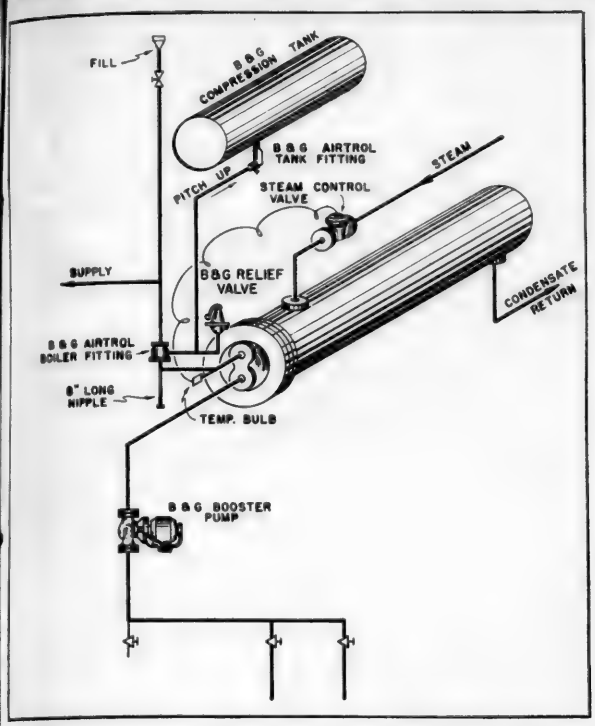
Flo-Control Valves


Compression Tanks

Package Liquid Coolers



HEATING SYSTEM DESIGN

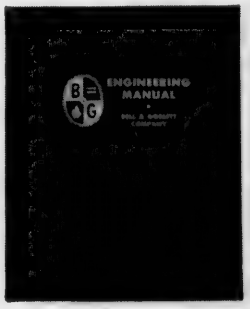


Snow melting installation for industrial building

The design of this snow melting installation is presented in complete detail in the B&G Engineering Manual.

A snow melting system primarily differs from a panel space heating system in the heat load calculation. The heat load of the snow melting panels in most cases is determined by the pick-up load, or the heat required to raise the temperature of the cold slab to a temperature which will melt snow.

Since a snow melting system heat load is directly related to the depth of bury of the pipe coils, this important point is covered thoroughly in the Manual. In concrete examples, it is demonstrated how depth of bury can be varied to provide a design solution which is sound in engineering, construction and cost.



See your local B&G Representative for a copy of the B&G Engineering Manual.

B&G QUIET PUMPS FOR CIRCULATED WATER SYSTEMS

Whether for snow melting or heating and cooling systems, B&G Booster and Universal Pumps have an outstanding record for dependable performance. They are distinguished particularly for *quiet, vibrationless* operation. The features which contribute to this all-essential characteristic include specially designed and tested motors—oversized shafts—spring-type flexible couplers and long sleeve bearings.

B&G Circulating Pumps are oil lubricated, with water positively sealed from the bearings by a Mechanical Seal developed by B&G. These pumps can be easily serviced without breaking pipe connections—removal of a few bolts permits separation into three parts.

A complete range of sizes is available, with capacities to 1650 GPM, heads to 86 ft.

B&G HEAT EXCHANGERS

Available as steam-to-water or water-to-water units. The exchanger illustrated is the "WU", equipped with B&G Booster for pumping boiler water through the shell. Pumped circulation greatly increases the capacity of the heater and permits close control of water temperature. Send for catalogs GC-1054 and GN-1054.

Centrifugal Pumps

Evaporators and Condensers

BELL & GOSSETT

COMPANY

Dept. FB-4. Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

Equipped with trouble free

ALLEN-BRADLEY MOTOR CONTROL

Trane's air-conditioning system in the London Guarantee Building, Chicago, uses Allen-Bradley solenoid motor control.

Manufacturers of large air-conditioning and refrigeration systems realize that the reliability of their system and the reliability of the motor control used are identical—for all practical considerations. That's why the Allen-Bradley trademark—the sign of quality motor control—is so frequently seen on important jobs.

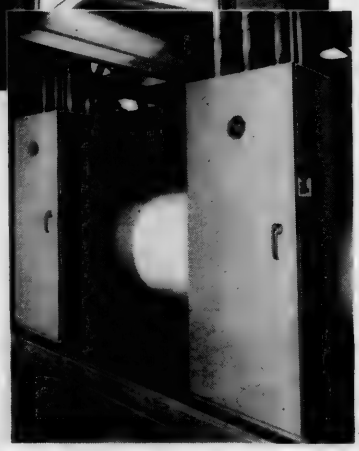
The simple solenoid starter design—exclusive with Allen-Bradley in *all* sizes up through Size 7—has only *one* moving part. This is your assurance of millions of trouble free operations. There are no bearings to corrode and stick . . . no flexible jumpers to wear and break. Also, the double break, silver alloy contacts—used throughout the Allen-Bradley line—never need cleaning, filing, or dressing. Downtime for contact maintenance is eliminated . . . and so are "service calls." You can install Allen-Bradley motor control . . . and forget it.

A decision you'll never regret—to standardize on Allen-Bradley motor control. Its proven reliability costs you no more. The Allen-Bradley trademark is universally accepted.

Please write for your copy of the latest Allen-Bradley Handy Catalog . . . the 132-page guide to trouble free a-c and d-c motor control.

Allen-Bradley Co., 1330 S. 2nd St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

One of the Bulletin 709 Size 7 across-the-line starters used with the 250 hp, 208 v pump motors.



● The two Bulletin 709 Size 7 across-the-line starters for parallel pumps. Single or dual operation. Alternate starting is also provided.

● Zone air handling units are mounted on each floor in the elevator shaft. A set of two Bulletin 712 Size O combination starters—one for each intake and exhaust motor—are used with each of the 19 units in the building.

A-B

THE SIGN OF QUALITY MOTOR CONTROL

An Important Announcement

TO ASSURE YOU THAT AIR MOVING EQUIPMENT..

...will perform according to its published ratings

An international program is under way by AMCA. It will provide you as rapidly as possible with a means of identifying those types of air moving equipment qualifying under the program.

As a protection to you, practically all leading manufacturers of air moving equipment are planning to qualify their standard products in tests made in accordance with the AMCA Standard Test Code and in laboratories inspected and approved by AMCA.

Each qualifying company will operate under a license agreement with AMCA basically requiring the following:

1. The manufacturer's laboratory must be approved by AMCA.
2. Qualifying equipment must be tested in accordance with the AMCA Standard Test Code and published ratings must be in accordance with such tests.
3. The manufacturer must maintain manufacturing control of the products involved so that the equipment will perform in accordance with published ratings.

For more details fill in and mail the coupon below.

AIR MOVING & CONDITIONING ASSOCIATION, INC.

CUT OUT AND MAIL

AIR MOVING & CONDITIONING ASSOCIATION, INC.
2159 Guardian Bldg.
Detroit 26, Mich.

Please let me have details on the AMCA Program for rating of air moving equipment.

NAME_____

COMPANY_____

ADDRESS_____

CITY & STATE_____

A welder caused us to caucus

The note from an employee suggestion box read "How come a company like this hasn't got the U. S. Savings Bond Payroll Savings Plan". It was signed by a welder in the fabricating department.

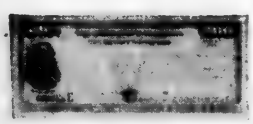
Since we actually *do* have Payroll Savings this told us two things: (1) Probably more employees than we imagined wanted the advantage of buying U. S. Bonds automatically through Payroll Savings. (2) We had grown lax in bringing our Plan to their attention.

But what to do? The solution was simplicity itself.

We called in our State Savings Bonds Director. He provided all the promotional materials needed to arouse interest in U. S. Savings Bonds. Then he helped to conduct a personal canvass and place an application blank in everyone's hands.

The results were amazing. Employee participation shot up to a percentage that we could take pride in. There was no "hard selling", nor was work interrupted. Our people wanted the security U. S. Savings Bonds offer them.

Today there are more Payroll savers than ever before in peacetime. Your State Director will be happy to help you install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write: Savings Bonds Division, U. S. Treasury Dept., Washington, D. C.



AIR CONDITIONING, HEATING & VENTILATING

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTIC DONATION, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

THEY SMASHED INTO THAT WEIRKOTE® TILL WE COULDN'T STAND IT!

When a half-ton steel wrecking ball smashes broadside on target—mister, that's a *test*.

Yet, when Weirkote zinc-coated steel is put through that, or equally brutal punishment, its zinc coating stays skin-tight throughout the ordeal.

Think of that demonstration in terms of *your* products, production steps and cost problems.

Weirkote's continuous-process zinc coating *thrives* on toughest fabrication steps—spinning, deep drawing, roll forming, extrusion. And there's no flaking or peeling.

With Weirkote, you can eliminate the cost of plating, painting or redipping after fabrication. In many instances, you'll get prolonged die life, too, due to the lubricating quality of Weirkote's zinc coating.

Free Weirkote Booklet

Send for the new booklet on Weirkote today. Write Weirton Steel Company, Dept. N-6, Weirton, West Virginia.

WEIRTON STEEL COMPANY

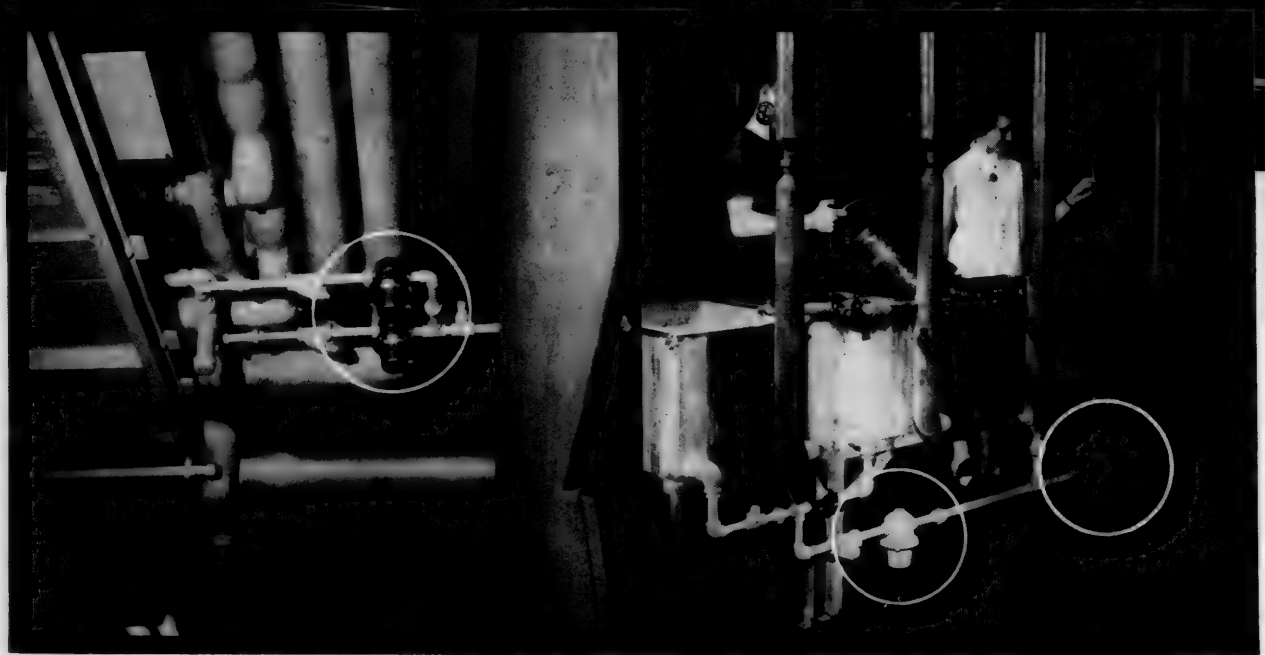
WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

illinois TRAPS CUT FUEL AT SHEAFFER



BUILDING HEATING. Here are two of the Illinois traps at the Sheaffer plant. A switch to Illinois resulted in perfect comfort temperatures and a reduction of more than one fourth in fuel consumption.

PROCESSING. Plant Engineer John Manshein reports that Illinois traps were the *only* traps among those tested that could function properly on these plating tanks.

BILL 25% PEN COMPANY PLANT!

Sheaffer Pen Company, Fort Madison, Iowa. Designed and constructed by The Austin Company.

Plant engineer's tests prove Illinois superiority in both building heating and processing operations

THE PROBLEM

After Sheaffer Pen Company built its modern, air conditioned plant at Fort Madison, Iowa, Plant Engineer John Manshein encountered heating problems. He found that some areas of the building could not be brought up to comfortable temperatures.

WHAT WAS DONE

First, Mr. Manshein made a thorough investigation. As a result of this, he ordered six traps from various manufacturers and put them through his own rigid testing program.

RESULT

These tests led to the installation of Illinois traps throughout the building. *During the following heating season, the building was perfectly comfortable and fuel consumption dropped more than one-fourth!*

Processing, Too!

Mr. Manshein conducted his own tests, also, on traps serving the plant's many plating, wash and rinse tanks with the same result—a switch to Illinois. He says that Illinois traps were the *only* traps among those tested that could take the very rapid valve openings and closings for prolonged periods.

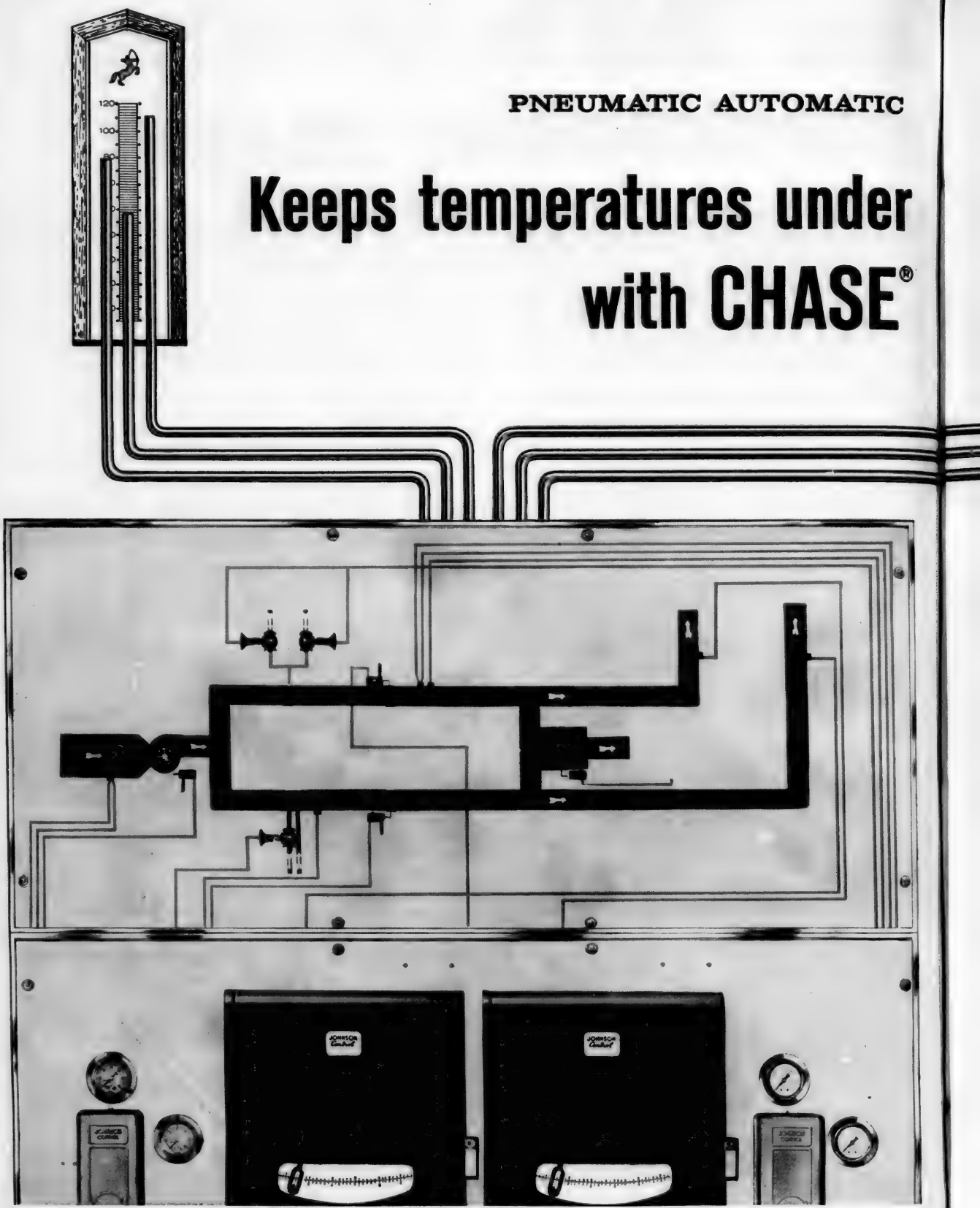
Select from a complete line of thermostatic traps, float and thermostatic traps and steam traps—25 inches vacuum to 600 lbs. pressure. Write for Bulletin 110 today.

illinois ENGINEERING

Illinois Engineering Company
2035 S. Racine Ave., Chicago 8, Ill.
A Division of American Air Filter Company, Inc.

PNEUMATIC AUTOMATIC

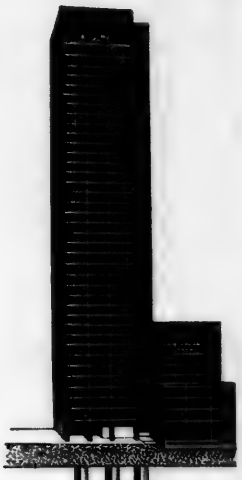
Keeps temperatures under with CHASE®



Typical pneumatic control panel has graphic illustration of Chase Copper Tube. Shows intricate pattern of tube controlling individual systems, of which there are thirty throughout the building from basement to penthouse.

CONTROL SYSTEM

control in Seagram Building copper tube!



BRONZE SKYSCRAPER HAS 30 MILES OF CHASE COPPER TUBE

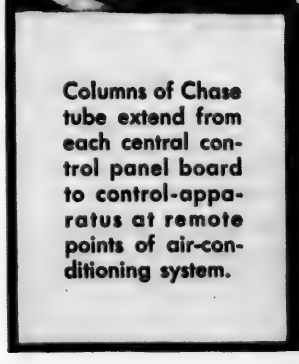
3,000 control valves...1,000 thermostats...dozens of panel boards...all inter-connected by a 30-mile network of Chase Copper Tube! That's what it takes to control the temperature, flow and pressure of air, steam and water for the complete air-conditioning system in the monumental new bronze building at 375 Park Avenue.

Only the best would do for New York's most modern, most magnificent skyscraper. So for the installation of its Automatic Temperature and Humidity Control System, a completely pneumatic control system, utilizing Chase Copper Tube, was used. Based on past performance, Chase Copper Tube was chosen for its durability, low cost and attractive appearance.

Quick and easy to install, Chase Copper Tube saves both time and money...makes a virtually "permanent" installation, operating always at peak efficiency. In addition, Chase offers prompt, completely reliable delivery of desired quantities—a vital factor where storage is at a premium and delay costly.

For time-tested quality plus the service you require, plan your modern control installation with Chase Copper Tube!

Bending up over steam line, Chase Copper Tube can be installed quickly and easily; can be counted on for dependable service over the years.



Columns of Chase tube extend from each central control panel board to control-apparatus at remote points of air-conditioning system.

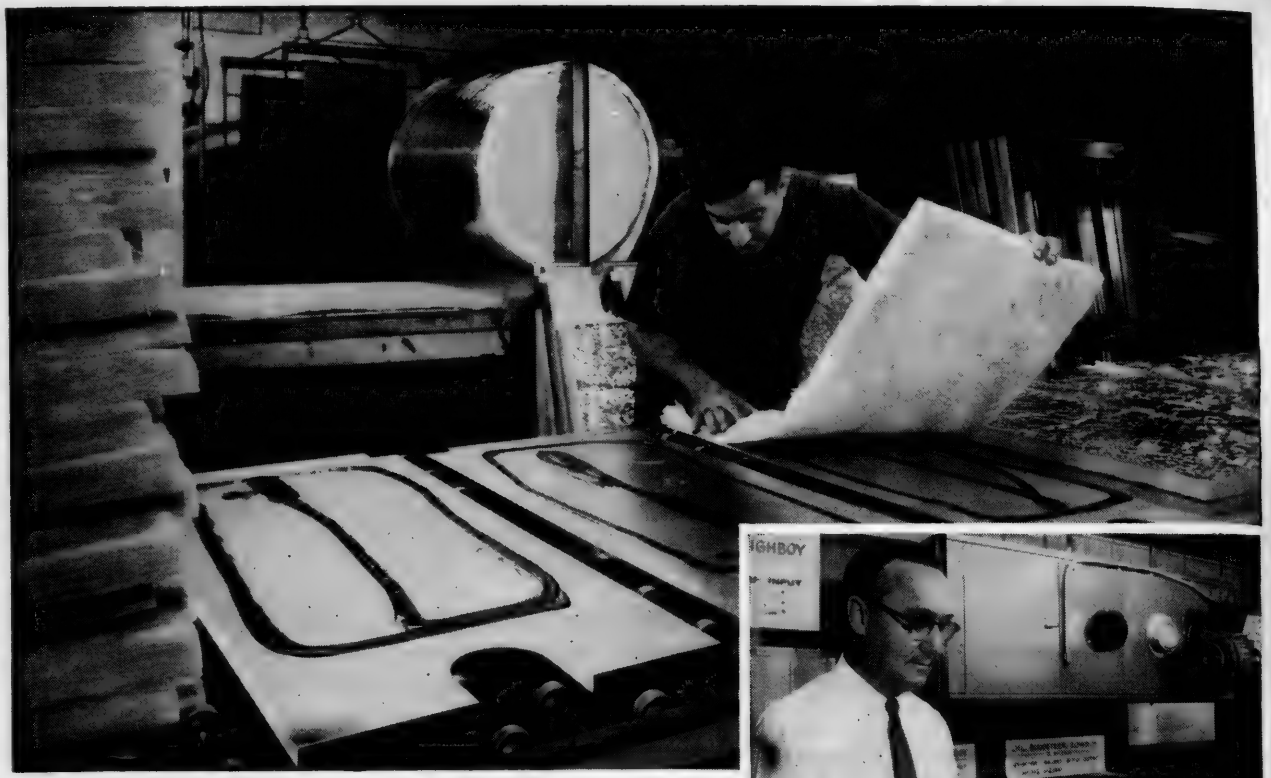
Chase BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass, Copper and Stainless Steel

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York (Maspeth, L.I.) Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury



Pittsburgh Superfine is applied to Rheem Heater panels. Superfine cuts standby heat loss, increases heater efficiency far above the 80% required by gas and oil companies.

Plant Manager Gordon Cheasley reports that Superfine saves production time and shipping costs, is safer to work with than previous insulating material.

"Thanks to Pittsburgh Superfine, Rheem heaters have the best insulation in the industry!"

says Mr. Gordon L. Cheasley, Plant Manager, HOME PRODUCTS DIVISION
RHEEM MANUFACTURING COMPANY, NEW CASTLE, DELAWARE

"The use of Pittsburgh Superfine helps Rheem five ways in the production of our heaters," reports Mr. Cheasley.

1. **Low heat loss—increased efficiency.** "Pittsburgh Superfine cuts the standby loss of heat in our units and has increased their efficiency to far above the 80% required for approval by gas and oil companies."
2. **Constant resiliency.** "We ship several models disassembled in cartons. Superfine is compressed for packing; yet after a year's compression time, Superfine 'bounces' right back to its original thickness."
3. **Faster production.** "Superfine's lightweight factor saves handling time. Cutting is done quickly and easily. One man can cut, place insulation on eight panels per unit, and pack 25 units a day for shipping."
4. **Safer to work with.** "The insulation material we previously used caused employees discomfort and skin irritation due to glass particles working loose. Superfine's superior quality eliminated this, ended complaints and raised employee morale."
5. **Lower shipping costs.** "Lightweight Superfine saves us 10 lbs. in total weight shipped per carton of panels . . . an important cost-saving factor."

Have you tried Superfine?

Pittsburgh Superfine is ideal for all types of heat and cold insulation, and for sound deadening, too. Get the complete Superfine story from your local PPG Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

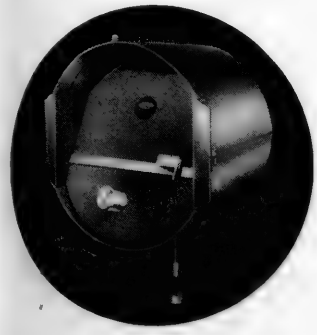
Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER GLASS PG PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

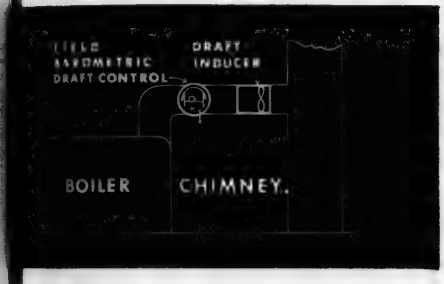
PITTSBURGH PLATE GLASS COMPANY

FIELD BAROMETRIC DRAFT CONTROLS

increase the efficiency of induced-draft installations



FIELD TYPE "M" Barometric Draft Control for coal or oil, sizes up to 32".



Field Barometric Draft Control installed in connection with a draft inducer prevents fuel waste caused by wide variations in draft.

FIELD TYPE "MG" Barometric Draft Control for gas or oil-gas, sizes up to 32".

When a draft inducer is used, to assist a faulty chimney, or to permit modern, low-stack construction, a Field Barometric Draft Control should also be installed. In such an installation, the inducer can be set to meet maximum, "high-fire" draft needs without risk of excessive draft. Whenever the draft requirement is less than the draft inducer setting, the Field Control automatically reduces the draft. Here is why the Field Draft Control can make an important contribution to efficiency at all firing rates:

1 – During "off-fire" periods, even the *natural* draft present may be excessive. Field reduces the draft, prevents rapid cooling of the boiler.

2 – During "low-fire" periods, the artificially induced draft may be greater than needed to vent a relatively small volume of gases. Field regulation prevents the loss of high temperature gases.

3 – During "high-fire" periods the Field Control compensates for continuously variable factors affecting draft. For example:

Changes in line voltage, affecting blower speed, change the volume of gases handled and thereby affect the draft. Changes in resistance caused by the accumulation of fly ash or soot in boiler and breeching cause changes in the draft needed.

Changes in wind and outside temperature, affecting natural draft, cause variations in the artificial draft needed.

Where a number of boilers are discharging into a common stack, the need for draft will vary as firing rates vary. Draft required with all boilers on "high-fire" may be excessive when one or more boilers cut out.

A Field Barometric Draft Control, sensitive to the slightest change in pressure, corrects for any variation, holding draft to the required setting. Write us for technical data. Field Draft Controls are available in sizes up to 32 inches for oil, gas, coal and oil-gas installations.

field

FIELD CONTROL DIVISION
of H. D. Conkey & Company, Mendota, Illinois

AFFILIATES:
Conco Building Products, Inc. • Brick, Tile, Stone — Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 10, Ont., Canada

Now, trim new Wall-Fin
custom styling with

New functional beauty! TRANE Wall-Fin brings draft-free heating plus modern design to long wall and window areas. Large tube diameters make it especially suitable for loop systems where pressure drop is critical. Element is mounted on ball bearings to provide free, silent expansion with no strain on enclosure. New reinforced construction holds shape during shipment and installation. Available in a wide variety of styles to suit any building plan.

...from Trane gives you ...production models!

Simple, rugged construction and smoothly fitting components give you "custom-built" appearance on every job

When you specify new TRANE Wall-Fin, you can depend on getting a trim, neat job with smooth joints and perfect alignment every time. And new TRANE Wall-Fin is ruggedly built with die-formed parts . . . custom-fitted components that will take years of hard use—yet retain their sleek, tailored appearance. Reinforcing channels and gussets at points of strain prevent sagging, bending.

The new TRANE Wall-Fin has been designed with fewer parts . . . with *precision-held dimensions* on all parts to assure a "custom-built" appearance with far less on-the-job fitting and tailoring. New slip-joint construction makes it easy to align, with smooth fit of all joints assured.

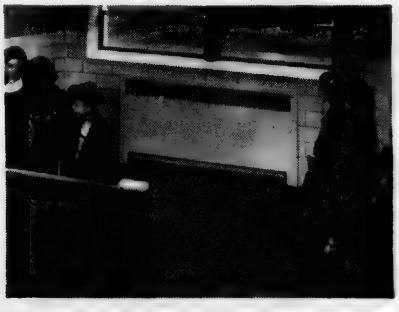
Since 1925, TRANE has pioneered in developing and improving radiation products. Now the broadest, most complete line in the industry, TRANE offers you everything you need for any radiation job—whether it's a single room or hallway, or the largest school or hospital. And when you turn to TRANE, you simplify procurement, pinpoint responsibility for *all* your radiation needs.

So for your next job, turn to TRANE! Just call your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.

Check these new TRANE Wall-Fin features:

- Extra rugged construction—reinforcing channels and gussets at points of strain.
- Precision-held dimensions on all parts—less on-the-job fitting. Fewer parts to assemble.
- Element glides silently on ball-bearing cradles for free expansion without strain on enclosure.
- All mountings are *inside* the cabinet—no interference when cabinet meets baseboard or coving.
- Smoother fit and easier alignment due to slip joint construction.
- Rubber channel strip seals cover to wall.
- Speedier fit-up of all key parts. Slotted holes for element and enclosure; rigid channel-reinforced top edge for easy, tight-to-the-wall fit without bolts or screws; snap-on bottom edge; pre-drilled holes for end laps.
- Wide range of styles, sloping, top or front outlet—available in 4" and 5¼" depth and three heights, for steam or hot water.
- Complete precision-built accessories—dampers, access doors, pilaster covers and end panels give real custom-built appearance.

TRANE Convectors combine efficiency with compactness and beauty. Aluminum-copper heating element responds quickly, provides heat instantly . . . eliminates wasteful overheating. Can be installed free-standing, recessed or wall-hung. 21 cabinet styles to choose from.



TRANE Wall-Line Convectors are designed for relatively short runs and very high capacity—providing attractive, modern wall-to-wall installations in schools, office buildings, hospitals and institutions. Compact and rugged construction, with extra reinforcements and full back.

For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

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90 U. S. AND 19 CANADIAN OFFICES

With Youngstown Steel Pipe on the job new **Lamson & Sessions** plant gets dependable, life-time piping system

To keep pace with the growing demand for their complete line of industrial fasteners, Lamson & Sessions Co. are erecting this new, beautiful, highly functional plant on Cleveland's Tiedeman Road. Providing dependability and long life for the plant's all-important piping system will be tons of quality Youngstown Steel Pipe.

For years leading architects, as well as progressive plumbing and heating contractors, have specified Youngstown Steel Pipe because it's been their guarantee of trouble-free water piping systems.

Youngstown Steel Pipe is made of only the finest steel with exacting attention given to all sizing, threading and finishing processes. Close quality control of every step in Youngstown's fully integrated operations—from ore mining to finish threading—produces the best pipe obtainable—anywhere.

Your Youngstown Pipe Distributor is only a phone call away —why not contact him today?

Building Owner:	Lamson & Sessions Company, Cleveland
Engineer:	The George S. Rider Company, Cleveland
General Contractor:	The Sam W. Emerson Company, Cleveland
Plumbing & Heating Contractors:	The Smith & Oby Co., Cleveland The Ed Sweeny Company, Cleveland
Distributor:	Grinnell Company, Cleveland

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon, Alloy and Yoloy Steel
General Offices - Youngstown 1, Ohio
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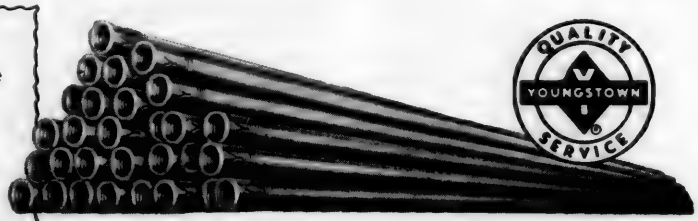
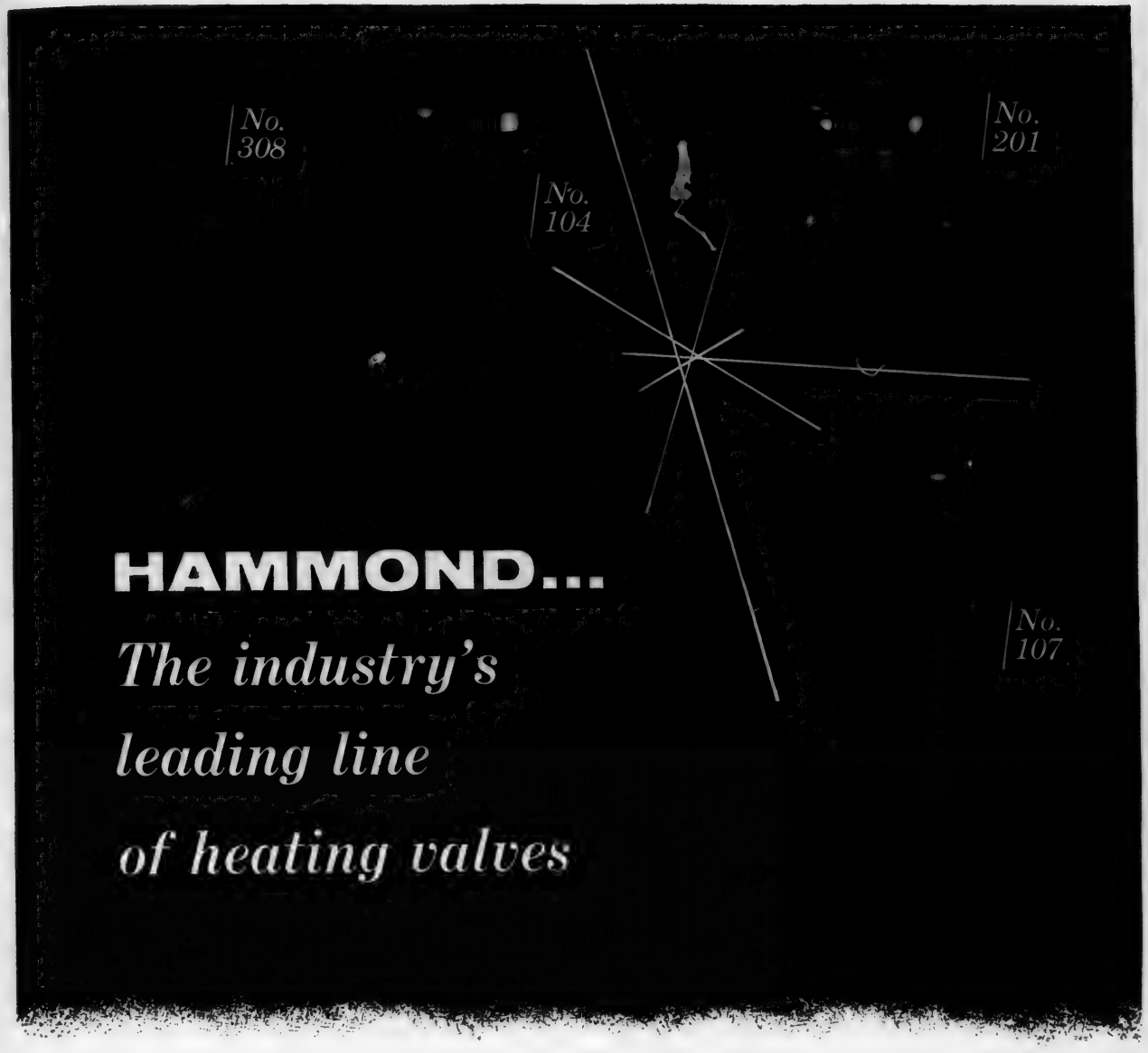
Specify Youngstown and secure these 7 Points of uniform goodness

uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform wall thickness and size
uniform strength and toughness
uniform roundness and straightness





HAMMOND, leader in bronze valves, offers one of the largest and most comprehensive lines of heating valves. Included are packed type radiator valves and elbows for steam and gravity hot water systems, and circulating valves, balancing elbows and fittings for forced hot water heating systems. All are available for copper to copper as well as with screwed ends.

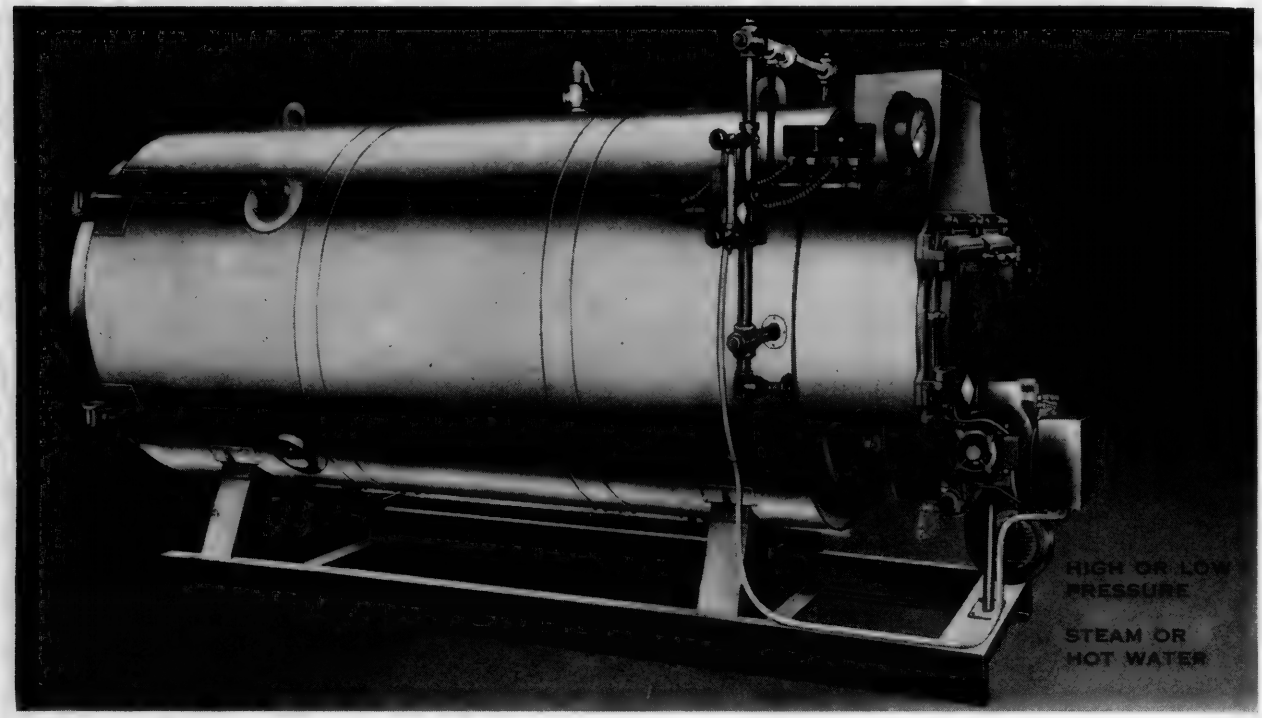
And each of HAMMOND'S 24 different types of heating valves has been specifically designed for outstanding performance in a particular job. For example, No. 107 heavy duty steam angle valve is designed for 150 lbs. WSP. It has a gland follower and double packing . . . plus a backseat which allows it to be repacked under pressure. No. 104 convector gate valve was especially designed for use with convector radiators—has double unions, male and female. No. 201 circulator was developed for use with circulating-type hot water systems—includes male union, and sweat connection. No. 308, for balancing radiant floor, wall and ceiling panels, is a balancing straightaway fitting with sweat connections, no unions.

Write today for a copy of our condensed catalog No. 146 which describes HAMMOND'S complete line of heating valves. HAMMOND heating valves are stocked by a leading plumbing wholesaler in your city. See him today.

HAMMOND BRASS WORKS, HAMMOND, INDIANA

HAMMOND *BRITE-KOTE*® BRONZE VALVES

Announcing 8 new KEWANEE



Kewanee low pressure boiler with Iron Fireman MicroMist forced draft burner for heavy oil.

All advantages of forced draft firing now available in smaller size series

READ THESE SPECIFICATIONS. SIZE RANGE: 18 to 92 bhp. FUELS: Light or heavy oils, gas, or combination oil-gas. FACTORY ASSEMBLY: All models available factory assembled as complete package units, ready for service connections on job.

In the new Kewanee-Iron Fireman series of package units, the important advantages of forced draft firing are extended to the small "Scottie, Jr." sizes. Thoroughly proved in worldwide installations of larger size units, this new series makes forced draft firing, with all its benefits, available for smaller boiler plants.

Forced draft advantages. Forced draft firing has many inherent advantages over other methods of gas or oil combustion.

With these units there is a 50% saving in electrical power for operating motors. This is important, particularly in the larger sizes. More positive regulation is assured by controlling the air at room temperature, rather than at exit gas temperature. Equipment is smaller and requires less maintenance. In addition, a forced draft unit is much quieter than a natural or induced draft unit. No high stack needed; requires only a vent pipe.

Boilers and burners conservatively rated. There is an ample reserve capacity beyond the rated output. Normal load is carried at a comfortable "cruising speed." This assures long life with low maintenance costs. Units operate at well above 80% efficiency even at 50% above the Steel Boiler Institute rating.

Only service connections required. All boiler fittings, automatic burner controls, fuel and air systems are installed and tested at factory. Units are fire tested and shipped as a unit if desired, or boiler and burner may be shipped separately if it is necessary to protect the burner from weather or vandalism during construction.

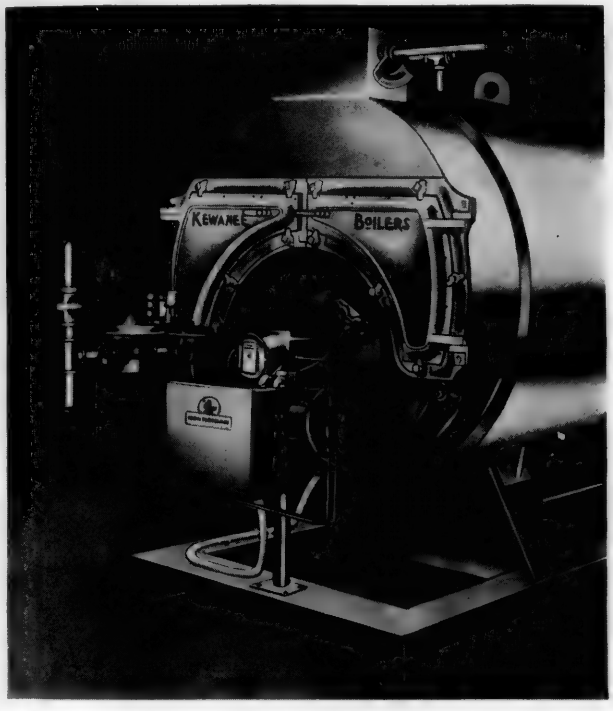
IRON FIREMAN forced draft package units

High or low pressure, steam or hot water boilers . . . all sizes, all fuels . . . *ready to hook up and GO*

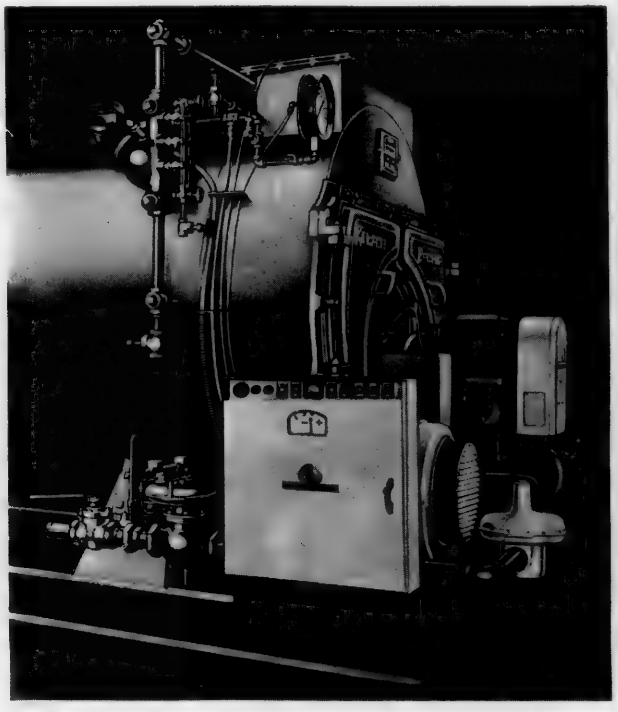
Light oil, gas or gas-oil. The Iron Fireman WhirlBlast burner is a new and advanced design. Its most outstanding feature is its ability to fire, with high efficiency, either gas or oil in a sealed combustion chamber, without flame pulsation. It is a true forced draft burner operating under firebox pressure. On dual fuel models, fuels are changed without mechanical adjustment, either through automatic controls or with the flick of a switch. From 18 to 92 bhp.

Heavy oil burner for smaller boilers. The ability to fire either heavy or light oils and to modulate over a wide range are the two outstanding features that make the MicroMist burner unique in its field. Its most notable feature is a two-stage supercharger atomizing principle which converts fuel oils, up to and including No. 5, to an air-oil mist that is readily ignited by an electric spark. No gas pilot required. For boilers from 18 to 92 bhp.

No. 6 oil or lighter—gas or gas-oil. This burner is designed for larger size boilers. Oil models incorporate the famous Iron Fireman horizontal rotary burner with Volumeter oil control, which accurately meters, by positive displacement, all grades of oil. The integrated ring type gas burner operates at highest efficiency at the same input ratings as are developed with oil. Available in sixteen sizes with capacity ranging from 59 bhp to 651 bhp.



Iron Fireman WhirlBlast burner (described above) fires either gas or light oil, or combination oil and gas, under forced draft. This is a new Iron Fireman development; never before available in the medium size range.



The Iron Fireman rotary forced draft burner (described above) fires any grade of oil, gas or gas-oil combination. It includes control panel, air and fuel systems. Control instruments are wired and tested at factory.

Write for catalog and specifications

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT FOR HEATING, PROCESSING, POWER

IRON FIREMAN MANUFACTURING CO.
3358 West 106th Street, Cleveland 11, Ohio
In Canada: Write 80 Ward Street, Toronto, Ontario.
Please send complete technical description and specifications.

☐ low pressure ☐ new 18 to 92 hp. units only
☐ high pressure ☐ all capacities

Name_____
Company_____
Address_____
City_____ Zone____ State____

There's only one Roll-O-MATIC AIR FILTER

...because there's only one Roll-O-MAT MEDIA!

...and the media is the filter!

A supposedly "equal" air filter might *look* like the AAF Roll-O-Matic, might conceivably even *operate* like it. But the *dirt-stopping* job is done 100% by the *media, and there's no media anywhere in the world like Roll-O-Mat!*

This fluffy white blanket of bonded glass fibers is the result of dozens of AAF research projects involving radically new methods, completely new materials. Roll-O-Mat compresses to paper-like thinness on the roll and loads into the filter like film in a camera. It's pre-charged with AAF viscosine—an exclusive product specially developed to retain its non-sticky consistency under an extremely wide range of temperature and humidity conditions.

There's no equal to the AAF Roll-O-Matic because there's no equal to Roll-O-Mat media . . . and the media *is* the filter! For complete information, contact your local AAF representative or write direct for Bulletin 248A.

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BETTER AIR IS OUR BUSINESS

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NOVELTY breaks the

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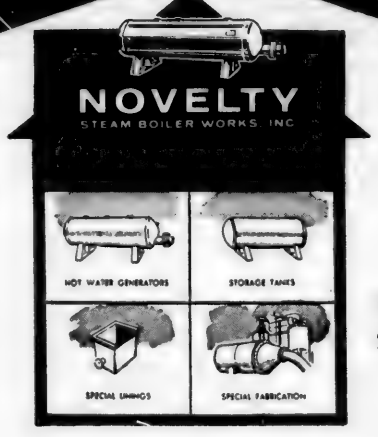

NOVELTY STEAM BOILER WORKS, INC.

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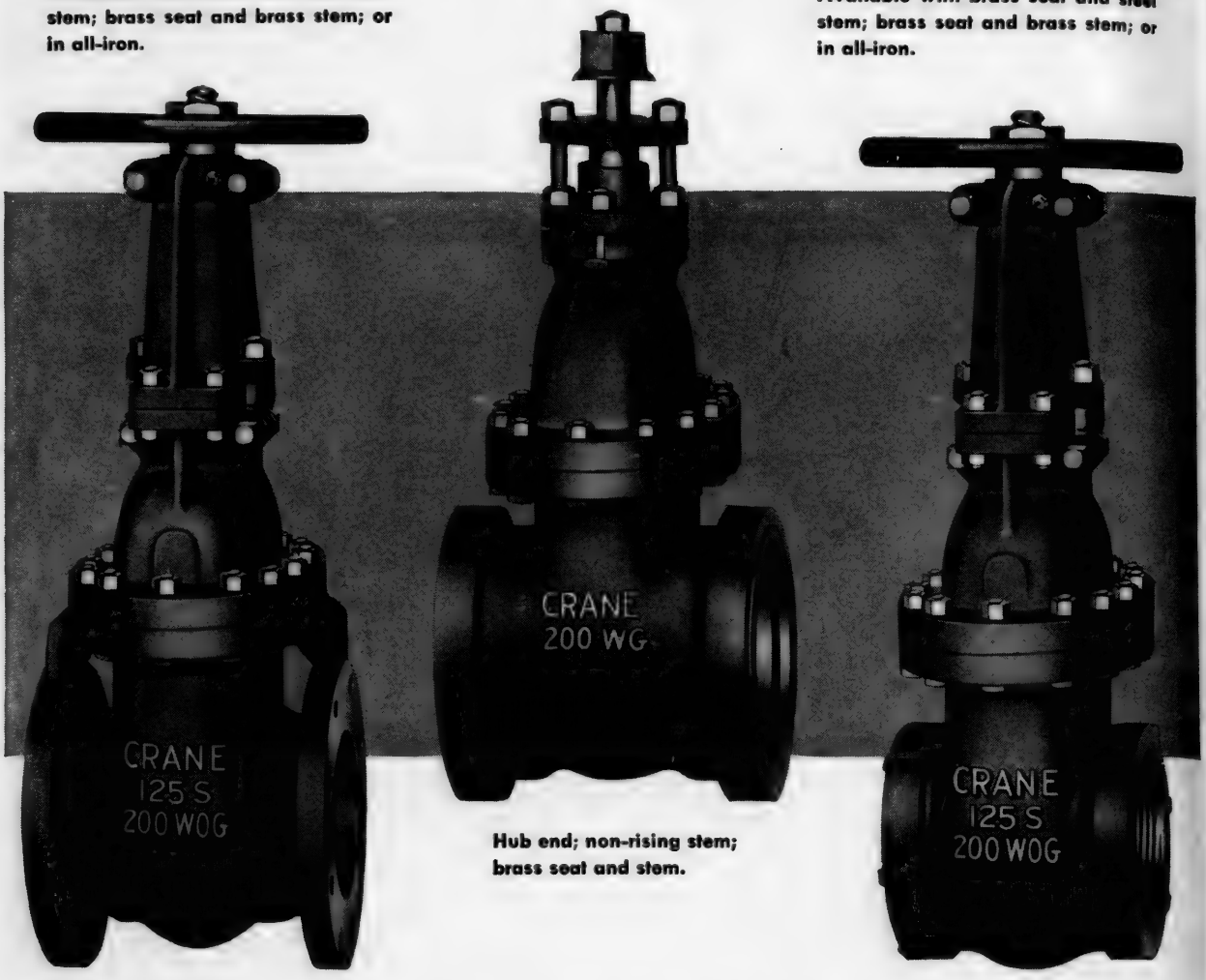
Representatives in Major Cities

Flanged end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.

Screwed end; outside screw and yoke. Available with brass seat and steel stem; brass seat and brass stem; or in all-iron.



Hub end; non-rising stem; brass seat and stem.

Crane Iron Body Gates–Versatile Valves

for Many Services in Nearly All Industries

Look to Crane for better performing 125-pound iron body wedge gate valves. Improved design gives them greater strength and important operational advantages. As a result, these valves offer dependable performance on a wide variety of services . . . easy maintenance . . . long life.

Among the advantages of Crane iron body wedge gates are:

- *Oval body and bonnet,* with extra metal where needed most.
- *No bonnet joint leakage*—More bonnet bolts on closer centers insure uniform bolt load distribution on bonnet joint and gasket.
- *Long disc guides* seat discs properly . . . minimize drag on seating surfaces . . . prolong valve life.
- *Shoulder-type seat rings* prevent rings from loosening in service.
- *Two-piece ball-type gland* prevents binding on stem even when gland bolt nuts are pulled up unevenly.
- *Exceptionally deep stuffing box* can easily be repacked under pressure when valves are wide open.
- *Available in 19 sizes*—2 inches to 48 inches—all-iron or brass trimmed. In addition, Crane makes companion valves in globe, angle, check, quick-opening and Underwriters' patterns.

For complete descriptions of Crane iron body gate valves, consult your Crane Representative, or write to Crane Co. at the address shown below.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Architects: VICTOR GRUEN ASSOCIATES • Consulting Engineer: RALPH E. PHILLIPS, Inc.
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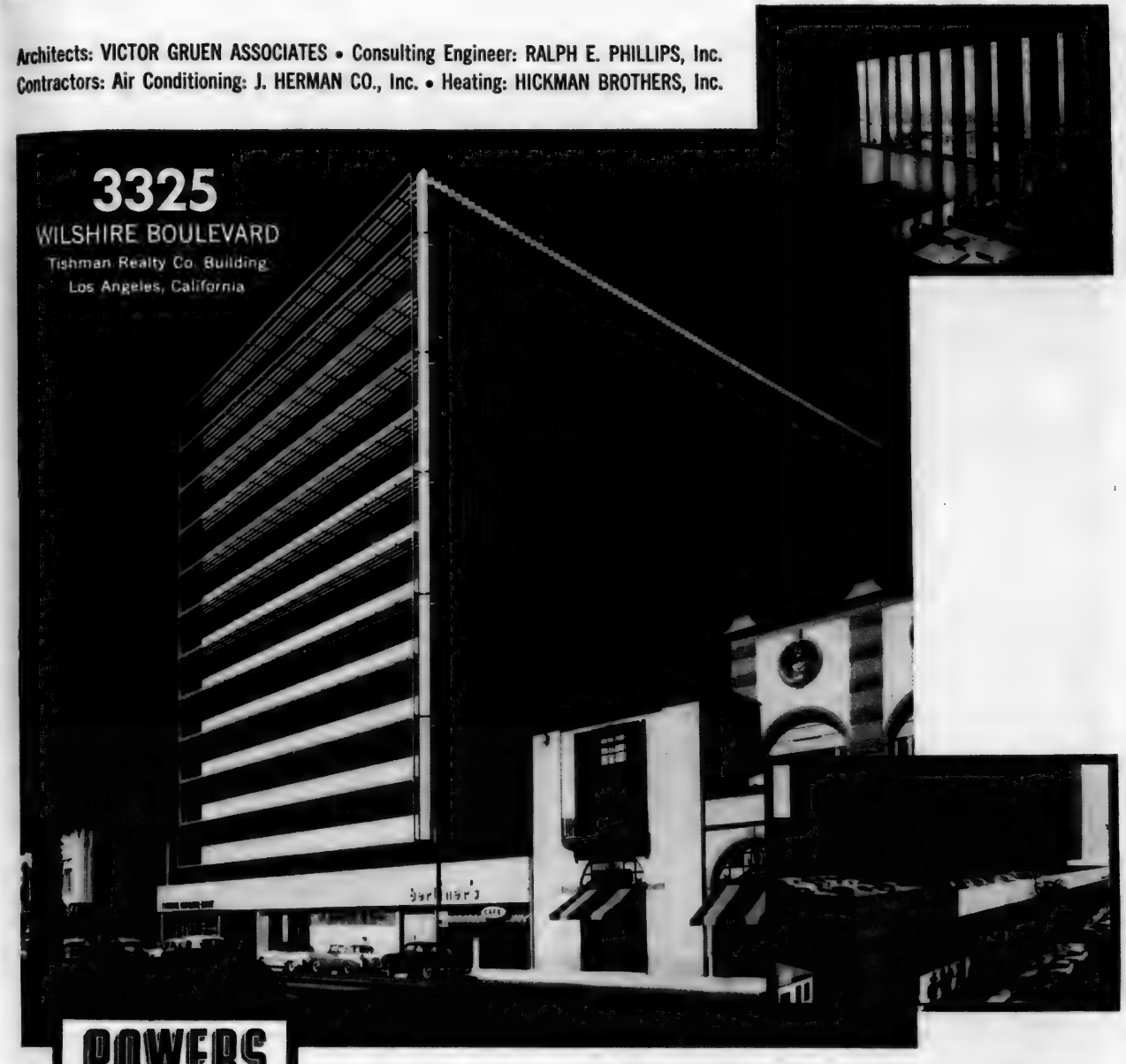

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Temperature Control + Sun Control = Thermal Comfort and Economy

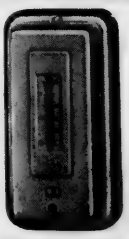
Greater tenant comfort and about a 10% reduction in the cost of air conditioning is reported to result from the large vertical louvers used on the east and west sides of this distinctive building. "Eyebrows" of horizontal louvers protect all north and south windows. **Indoors the climate is ideal.** Its air conditioned comfort is regulated by a Powers quality system of pneumatic temperature control. **In your new building** get the biggest return from the air conditioning investment . . . specify Powers control. Its greater SIMPLICITY and dependable performance enables it to provide uninterrupted comfort with a minimum of maintenance. For information contact our nearest office.

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico See your phone book*

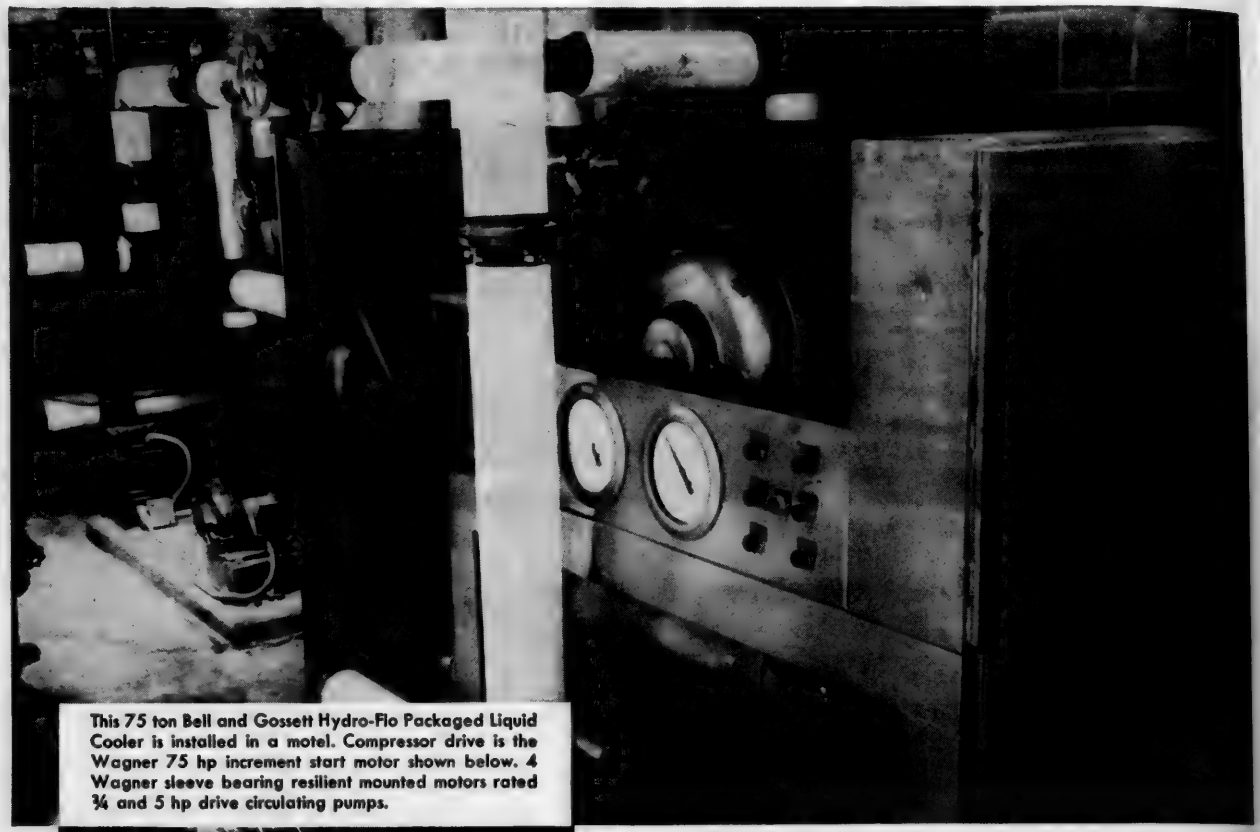
65 years of Automatic Temperature and Humidity Control

Symbol of Economy and Quality Control



Once set, a Powers pneumatic thermostat, holds temperature constant day after day. It needs no frequent checking or readjustment.

(230)



This 75 ton Bell and Gossett Hydro-Flo Packaged Liquid Cooler is installed in a motel. Compressor drive is the Wagner 75 hp increment start motor shown below. 4 Wagner sleeve bearing resilient mounted motors rated ¼ and 5 hp drive circulating pumps.

Wagner two-step combinations suit most applications. For installations where unusually low inrush of starting current is required, Wagner can furnish 3, 4, 5, or 6 step increment motor-starter combinations.

WAGNER

Increment Motor-Starter Combinations limit inrush of current when starting big motors

Part-winding starting is a good low-cost way to limit inrush of starting current on large squirrel-cage motor installations. Wagner Increment Motor-Starter Combinations permit such starting—meet all polyphase motor starting recommendations of AEIC—EEI—NEMA—and provide many years of troublefree operation.

These Wagner motor-starter combinations are not bulky, are easy to install, and are *proven* efficient and dependable in operation—Wagner has been supplying these combinations for over 17 years.

Why don't you investigate Wagner Increment Motor operation? Ask your nearby Wagner engineer to take you to an installation in your area. See how it works—judge for yourself, and then let him help you select the combination that meets your requirements. Call the nearest of our 32 branch offices, or write for Bulletins MU-128 and MU-195.

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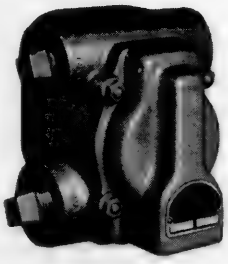
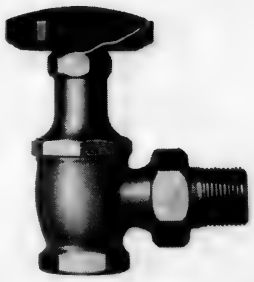
STEAM UNIT HEATER VENTS



FLOAT & THERMOSTATIC TRAPS

"Y" STRAINERS

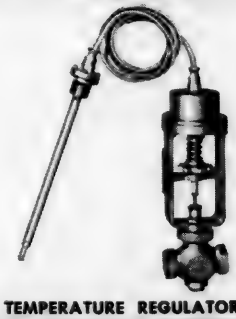


SUPPLY VALVES

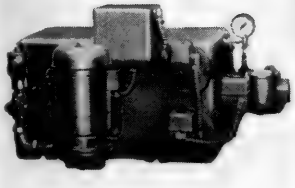
HOFFMAN

Steam Specialties

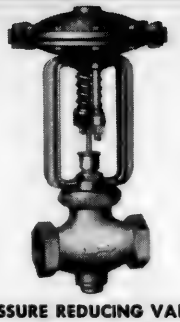
MAIN VENTS



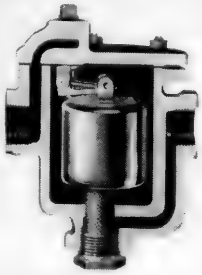
TEMPERATURE REGULATORS



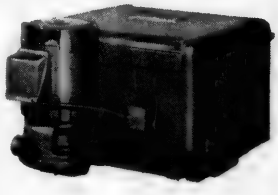
VACUUM PUMPS



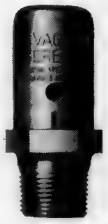
PRESSURE REDUCING VALVES



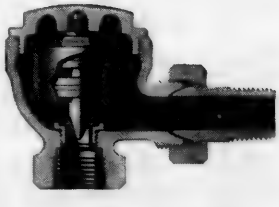
INVERTED BUCKET TRAPS



CONDENSATION PUMPS



VACUUM BREAKER



THERMOSTATIC TRAPS

HOFFMAN SPECIALTY MFG. CORP. 1700 West 10th Street, Indianapolis 7, Indiana

SOLD ONLY THROUGH LEADING WHOLESALERS OF PLUMBING AND HEATING EQUIPMENT

How Hartzell Duct Fans Help Cut Ventilating Costs

Lower Equipment Cost

Hartzell fans are competitively priced . . . yet they're designed and built for maximum reliability and long life. When you compare prices, estimate the service life of each make and rank them on the basis of cost per year of useful life. On that basis, Hartzell fans will always be by far your best buy.

Lower Installation Costs

Hartzell duct fans are much easier to install than many other types of ventilating equipment which might be used to do the same air-moving job. Each fan is a completely pre-fabricated duct section. To install a Hartzell duct fan you need only cut a section of duct work the same length as the fan, bolt angle iron flanges to the duct ends and bolt the fan to the flanges. After that, just install bracing and make electrical connections and you're done. Easy installation means fast installation . . . and real savings on costly labor charges.

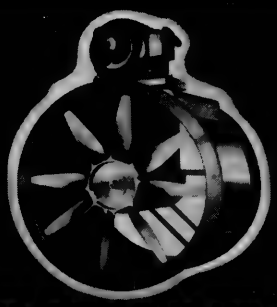
Lower Maintenance Costs

Hartzell duct fans require practically no maintenance. Their rugged construction and the high standards of quality in workmanship and materials to which they must conform practically eliminate failures under normal operating conditions. Routine maintenance requires nothing more than periodic lubrication and occasional replacement of belts. Motors on direct-drive models and bearings on belt-drive models are Alemite-lubricated from outside the duct. Belt changes or adjustments on belt-drive models are also conveniently made from outside the duct. Hartzell design and construction holds maintenance to a minimum . . . and that's a vital consideration under today's wage scales.

For complete details on Hartzell duct fans and how they can help you cut your air-moving costs, just call your nearby Hartzell field engineer. If you don't know him, just drop us a line for his name and address. And be sure to ask for Bulletin A-109.

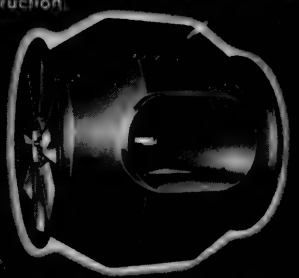
Why You Can Count on Hartzell Air-Moving Equipment for Long Life, Rugged Reliability and Minimum Maintenance

Hartzell fans and blowers are engineered and built for the exacting requirements of tough industrial service. There's no compromise with quality for the sake of shaving a few dollars on price. Hartzell fans are designed for the industrial buyer who is willing to pay for long life, dependable service and low maintenance.



BELT DRIVE DUCT FAN

These fans are the best choice for most installations where air (including that containing fumes, corrosive elements or dust) must be moved through a duct. Fourteen sizes, 12" to 60" fan diameters; single-propeller, two-propeller or multi-blade models in belt-drive or direct-drive construction.



BI-PASS DUCT FAN

This special model, with motor mounted in a tunnel completely out of the air-stream, is designed for moving corrosive fumes and air at temperatures as high as 550° F. Six sizes, 19" to 41".

REVERSIBLE DUCT FAN

This fan moves air in either direction with equal efficiency and can be supplied with controls for manual or automatic reversal. It is useful in many ventilating applications as well as in cooling and drying processes. Four sizes, 18" to 44".

HARTZELL
PROPELLER FAN CO.
Div. of Castle Hills Corp.

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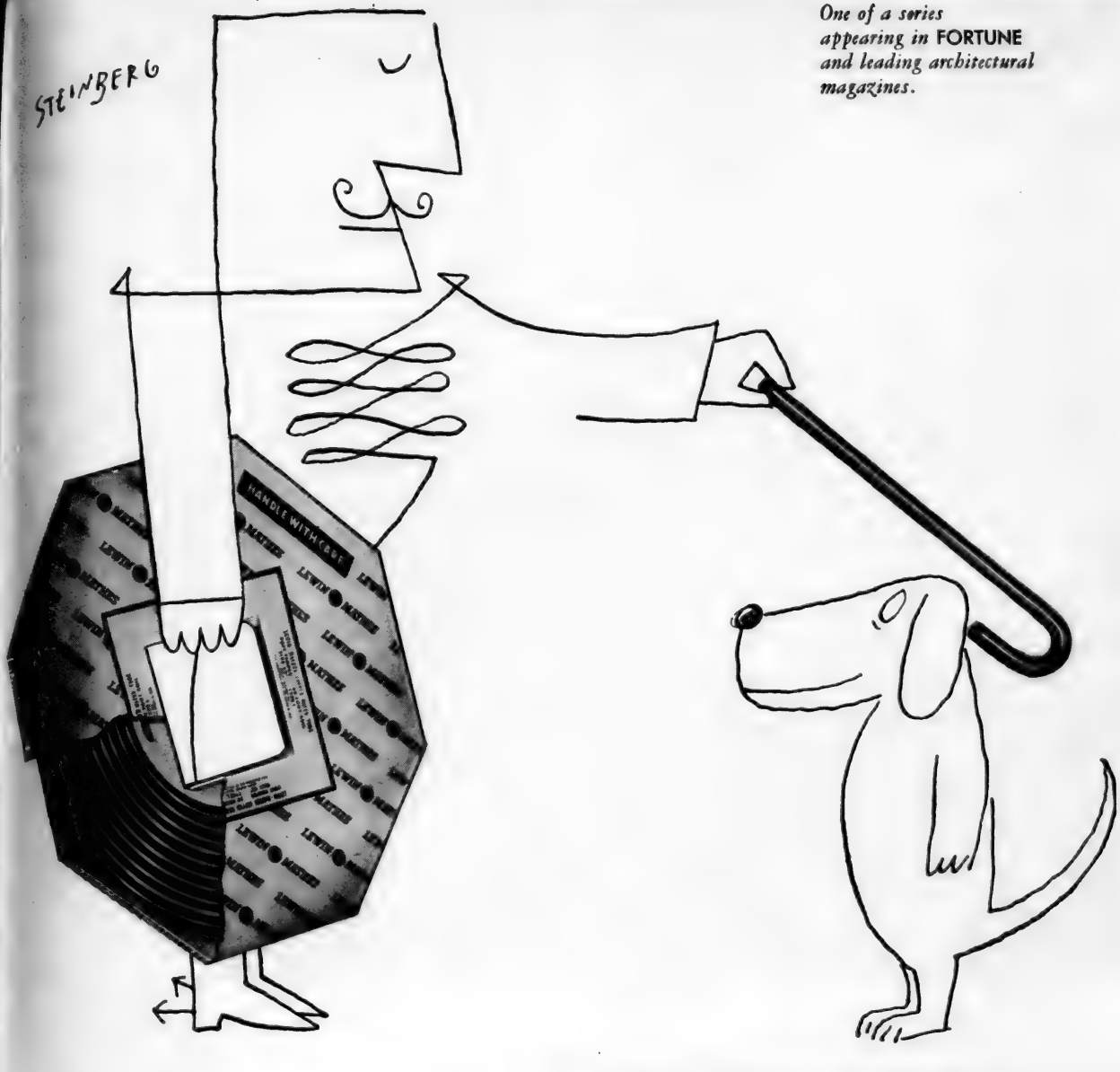
ENGINEERING OFFICES IN PRINCIPAL CITIES

One of a series appearing in **FORTUNE** *and leading architectural magazines.*



dogmatic

Our plant is an obedience school for Copper.

Here, Copper becomes pure, smooth and submissive . . . meets grueling tests for strength, tolerance and uniformity . . . acquires a high degree of authority as Lewin-Mathes Seamless Tube, Pipe and Rod.

With the dogmatic fervor of the ancient coppersmith, Lewin-Mathes remains the integrated *specialist* in its field. And our pride of product extends to our nation-wide service facilities . . . second to none, we believe, in efficiency.

If you use Copper tube or rod in your product . . . or are planning to build . . . ask your designer or architect about Lewin-Mathes quality. It costs no more.

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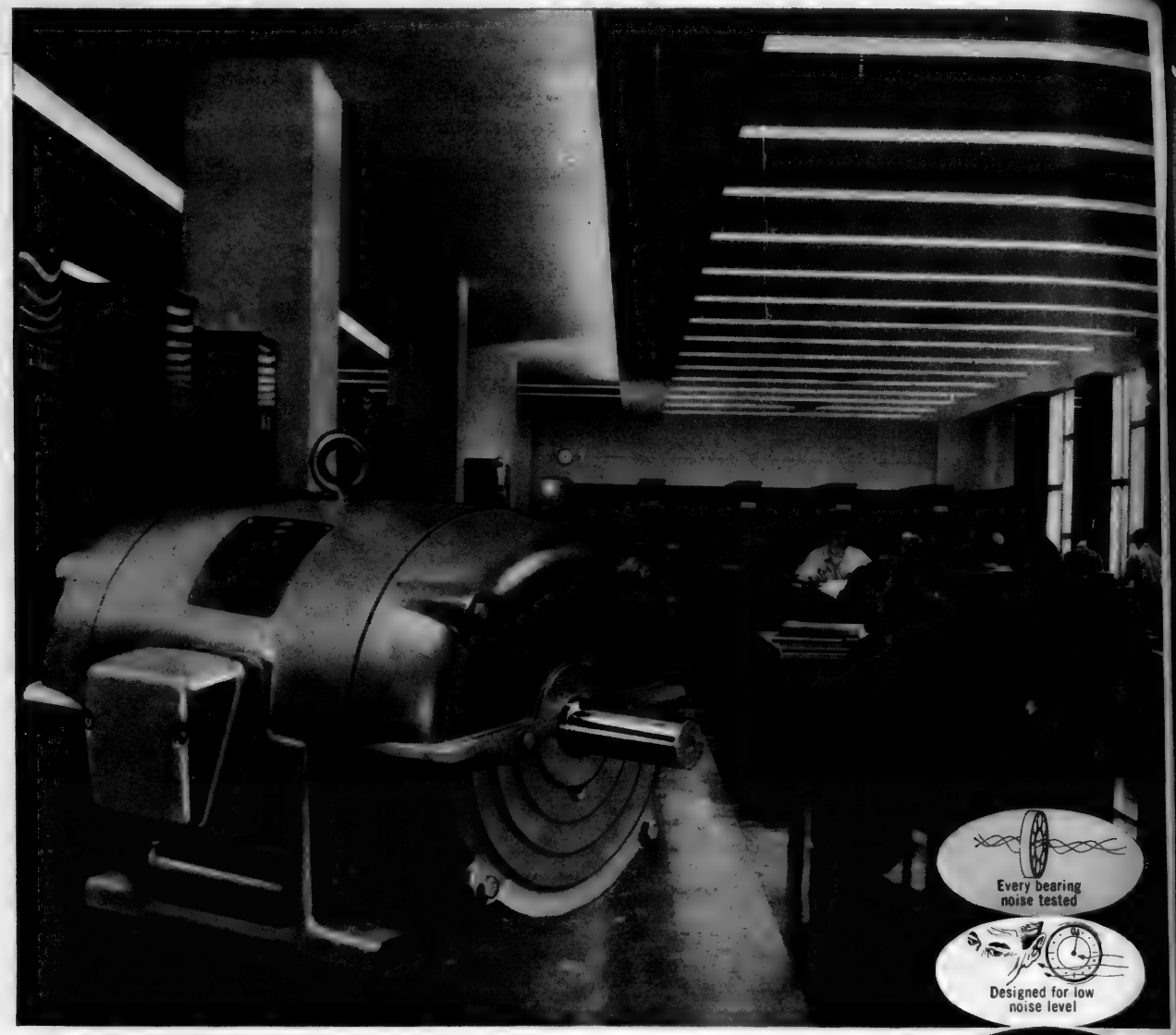
COPPER AND BRASS TUBE PIPE AND ROD

DIVISION OF CERRO DE PASCO CORP.



Not even a whisper . . .

Louis Allis motors "hush" air conditioning systems

Cool and quiet . . . ideal for library concentration. And you can assure this combination when you include Louis Allis motors with the built-in "hush" in your air-conditioning equipment.

This silence is golden — for you and your customers. It's vital to systems for hotels, motels, hospitals, and other institutions where quiet comfort is a "must" . . . in offices for increasing employee efficiency.

You'll find that Louis Allis motors are specifically designed for quiet air-conditioning performance. All parts are skillfully made and precisely balanced for silent, vibration-free operation. Housings, bearings, and end brackets are thoroughly tested for quietness. The result: silence — no disturbing resonance during the operation cycle. Part-winding motors are available to reduce starting currents to meet power company requirements.

For more information on this all-important "silent partner" in your air-conditioning business, contact your nearby Louis Allis District Office or write The Louis Allis Co., 454 E. Stewart Street, Milwaukee 1, Wisconsin. Ask for our file-size Bulletin No. 1700.

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MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES

WHEN FACED WITH A HIGH PRESSURE AIR MOVING JOB DEMANDING:

- MAXIMUM EFFICIENCY
- QUIET OPERATION
- SERVICE-FREE PERFORMANCE
- ADAPTABILITY TO VARIABLE INLET CONTROL
- EASE OF INSTALLATION

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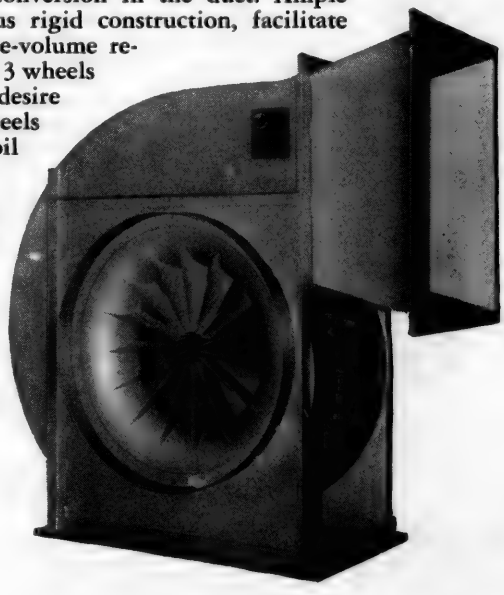
Where you want the above mentioned qualities in a system calling for Class II or heavier construction, this is the fan that will give complete satisfaction under most conditions.

The 92% mechanical efficiency of the Type "BA" Airfoil is an actual certified test figure, proved out time and again. And advantages don't stop there. Complete streamlining — inlet, wheel flange, wide-channel blades, housing and divergent outlet — provide a new level of quiet, smooth air handling and excellent static conversion in the duct. Ample flanges at inlet and outlet, plus rigid construction, facilitate installation. For various pressure-volume requirements, you have a choice of 3 wheels to deliver the performance you desire — as well as 3 semi-airfoil wheels closely approximating full-airfoil performance at lower cost.



Write today for Bulletin FD106 and check the "Q" Factor* that makes these fans your logical choice when you want the unqualified best in fans.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

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BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

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MARSH PACKLESS RADIATOR VALVES

WHEEL HANDLE

GRADUATED

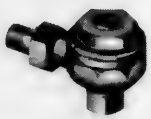
LOCK AND SHIELD

ANGLE PATTERN

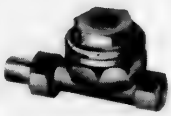
GLOBE PATTERN

CORNER PATTERN (Sectional Below)

MARSH THERMOSTATIC RADIATOR TRAPS



ANGLE PATTERN

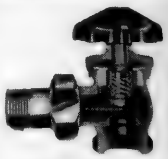


STRAIGHTWAY PATTERN

VERTICAL PATTERN

LEFT HAND CORNER PATTERN

RIGHT HAND CORNER PATTERN



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F&T TRAPS

No. 12, REPRESENTATIVE OF WIDE LINE

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No. 5 VENT, ONE OF MANY

BUCKET TRAPS

No. 500 INVERTED BUCKET TRAP

All the best of their kind!

You probably have made certain Marsh products your standbys without realizing there are a lot more of them just as superlative as the ones you like so well.

Make the acquaintance of some of them here, but, better still—***Ask for this Marsh Catalog!***

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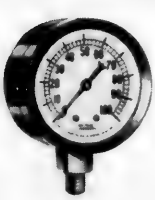

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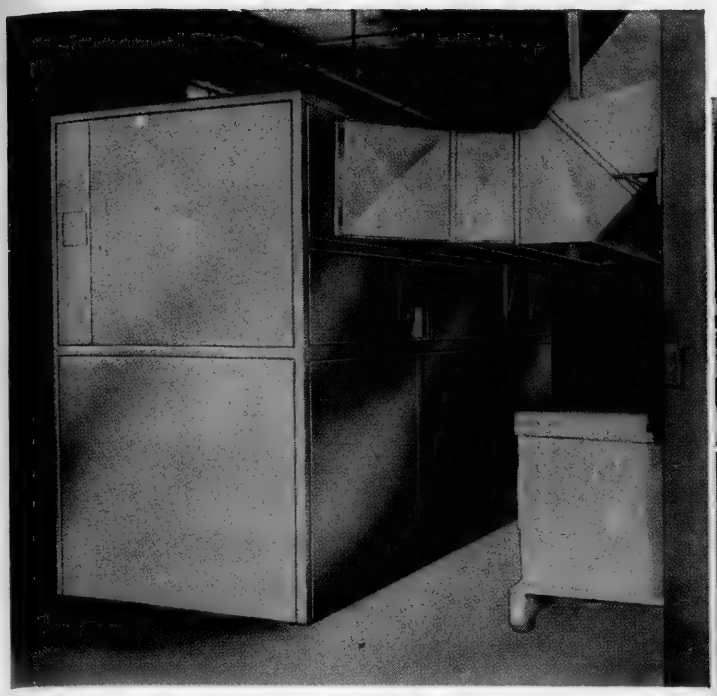
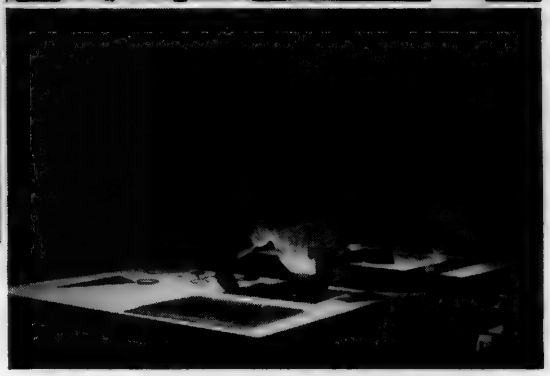




Engineers and Contractors: Tryon, Inc., Springfield, Mass.

SIMPLE TO SPECIFY...
SIMPLE TO INSTALL...
pre-engineered 'CPU' Air Conditioning Package

by DUNHAM-BUSH

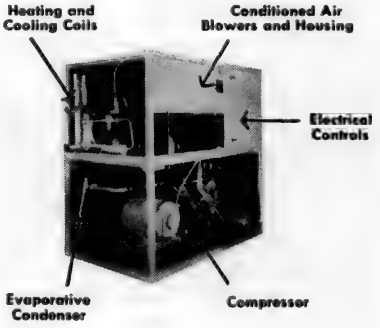
Proper control of humidity is an important consideration in a printing plant. At General Offset and Printing Company in Springfield, Mass. the decision was made to air condition the paper storage area, pressroom and "stripping" room.

Once this had been decided, top management executives naturally wanted the installation made quickly.

A Dunham-Bush 'CPU' Pre-Engineered air conditioner was selected. This unit is a complete air conditioning *system* housed in one cabinet—containing evaporator, compressor, evaporative condenser and pump, fans, motors, piping and controls.

Installation required only connection of power supply to control panel, connection of water make-up line and necessary duct connections.

For your next air conditioning job, why not eliminate specification and installation worries by selecting a Dunham-Bush 'CPU' Commercial Package Unit.



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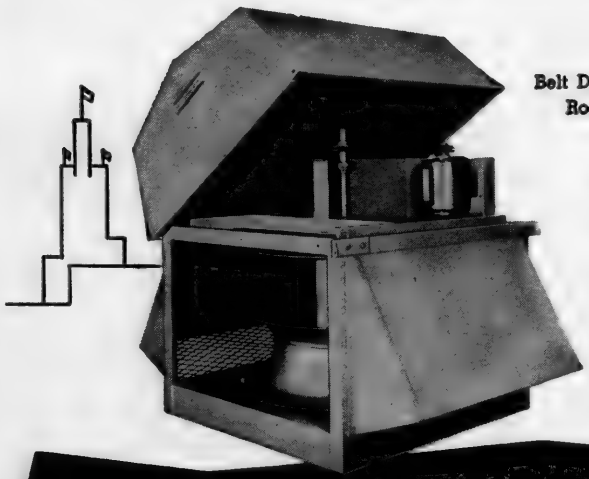
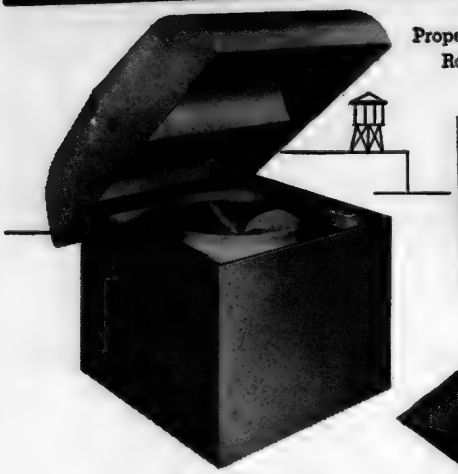


Belt Drive Centrifugal
Roof Ventilator

Recommended for their high quality, ease of installation, low maintenance cost, trouble-free operation, space-saving features, and blower-like performance.

Peerless Electric Roof Ventilators . . .



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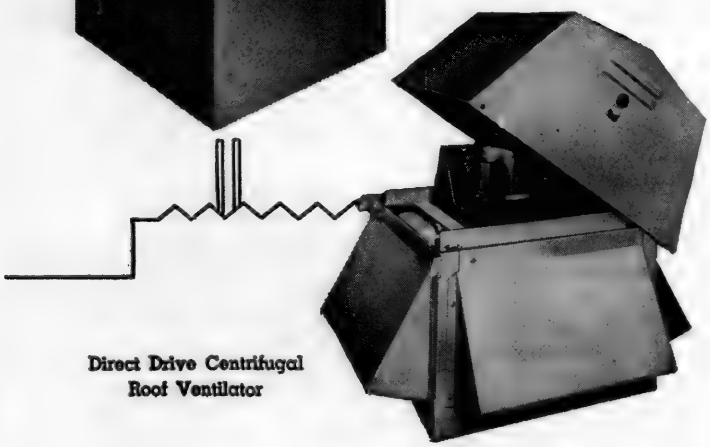
Certified Ratings
PFMA

Peerless Electric Roof Ventilators offer engineers, architects, contractors and users PFMA rated units that embody sturdiness, high performance ratings, and low noise levels. They are particularly suited for public buildings, industrial plants, hospitals, churches, schools, and other similar applications.



Direct Drive Centrifugal
Roof Ventilator

Sizes range from 12" to 60" wheels; 640 to 45,000 c.f.m., depending upon the unit selected. Peerless Electric Roof Ventilators are built of 16 gage steel, or heavier, to last the life of the building. They fit all standard curb sizes. Matching wheel cones accurately fit venturi inlet for quieter operation . . . smoother air movement.

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SEE OUR CATALOG IN SWEET'S

But it takes more than a sign to stop low water . . .

. . . and the hazards that can accompany a low water condition in both a steam and hot water heating boiler.

We are all agreed that our schools must be made as safe as possible. With schools so crowded today and facilities overtaxed, there is greater need for vigilance than ever before.

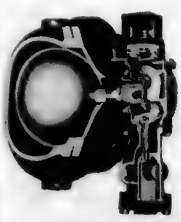
One thing you can do is to see that the boiler water line is under the endless vigil of McDonnell boiler water level controls. Low water can strike anywhere, for any of a score or more reasons, bringing with it the threat of serious and costly damage. And make no mistake about this: Low water is just as much of a possibility in hot water boilers as in steam boilers.

For the average school heating boiler, McDonnell Feeder Cut-off Combinations are a simple, time-proved answer. They add water automatically when needed to maintain a safe water level in the boiler, then stand by to stop the burner if any emergency condition drops the water line to a dangerous level. There is nothing better available for the vital task of protecting a boiler against hazardous low water.

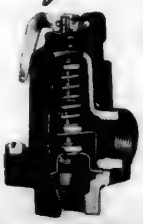
Right now is the time to act. Your local school board must rely on you to bring it to their attention. You'll be doing your community even a bigger favor than you do yourself.

McDONNELL & MILLER, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well



No. 51-2, the Boiler Water Feeder and Low Water Cut-off combination that fits most school jobs. For steam and hot water space heating boilers. Other combinations to fit all boilers.



230 Series Pressure Relief Valves for hot water space heating boilers. Meet ASME Boiler Code in every respect; rated and certified by the National Board.

No. 150 Pump Control, Cut-off and Alarm Switch. For boilers up to 150 lbs. The most widely used, time-proved control of its type. Also available with integral water column, as No. 157.

McDONNELL *Boiler Water Level Controls*

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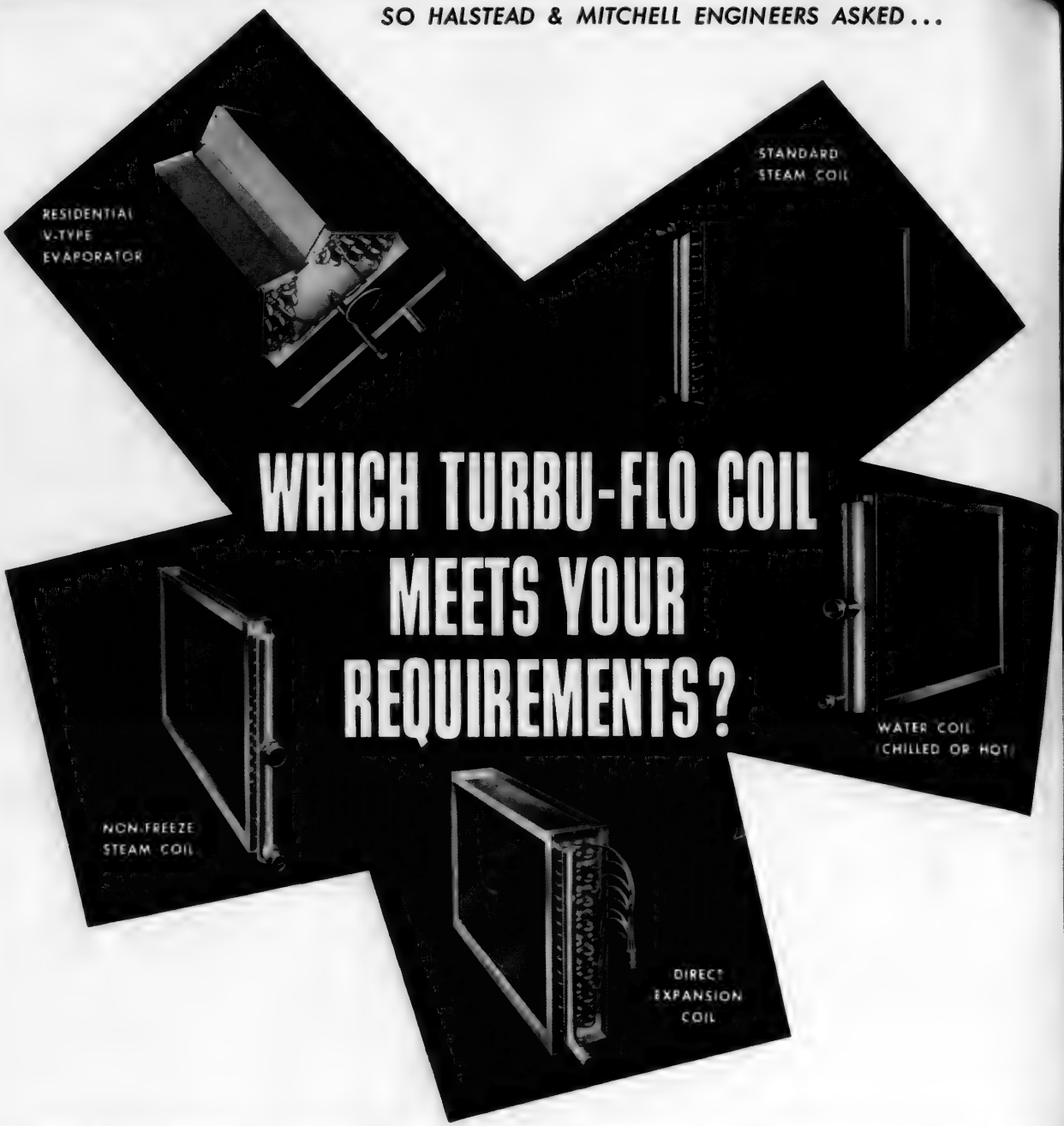

WHICH TURBU-FLO COIL MEETS YOUR REQUIREMENTS?

Halstead & Mitchell coils with Turbu-Flo fins are designed for rugged and long service life. And Turbu-Flo provides up to 15% more heat transfer capacity.

STEAM COILS are available in both standard and non-freeze types. WATER COILS are for use with chilled or hot water. DIRECT EXPANSION COILS are equipped with a pressure type distributor and circuited for minimum refrigerant pressure drop . . . will accommodate any make expansion valve, refrigerants 12 or 22. All coils are regularly available in from 1 to 8 rows deep, in finned heights of 12 to 36 inches, and in lengths up to 10 feet. Manifolding can be arranged for left, right or opposite-hand connections. Other sizes or special coil types can be provided to meet your specifications.

EXCLUSIVE, EFFICIENT TURBU-FLO

All coils feature the exclusive Turbu-Flo fins. Streamline design creates better air wash, lowering air film resistance and improving heat transfer; yet friction is at a minimum. Turbu-Flo fins are made of aluminum (available in copper), mechanically bonded to seamless copper tubing.

Casings are of heavy gauge steel fully protected against corrosion or of heavy gauge aluminum. Surrounding flanges simplify ductwork installation.

Write for more specific information, delivery and prices. *Halstead & Mitchell, Bessemer Building, Pittsburgh 22, Pa.*

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JENKINS PRACTICAL PIPING LAYOUTS

79

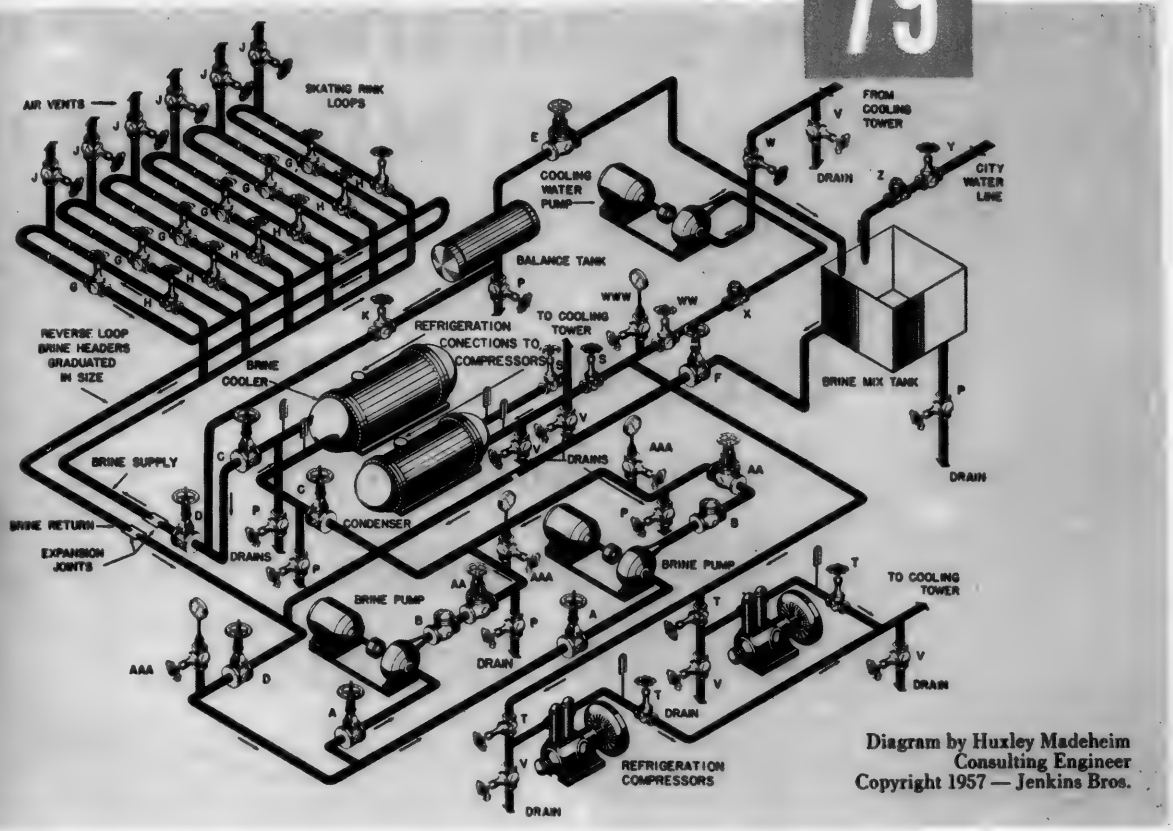

Diagram by Huxley Madeheim
Consulting Engineer
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How to plan piping for

AN ARTIFICIAL ICE SKATING RINK

In the increased construction of skating rinks during recent years, a closed system with a balance tank located at its highest point has been commonly installed. The piping layout presented here utilizes such a system.

This system is suitable for any of the common brines. Calcium chloride brines are the most common, but others of a non-corrosive nature are frequently used. The cooling medium, which is circulated in the rink coils to freeze the water into ice, is usually chilled by a multiple Ammonia or Freon refrigeration installation like the system in the diagram. Coils carrying the ice-making brine are generally 1" or 1¼" iron or steel pipe on 4" centers, with welded connections. Each coil loop is shown with a globe valve for control and shut-off at one end. A gate valve provides for shut-off and complete isolation of the individual coil at the other end. Each coil has an air vent.

Either or both of the two brine pumps may be used, depending on specific conditions and requirements. In addition to the brine circuit, the cooling water circuit to the condenser and compressors is diagrammed. Ordinarily, valves in this cooling water circuit are bronze or iron body bronze mounted.

For systems handling corrosive brines, such as calcium chloride, all-iron valves are specified. For systems using non-corrosive brines, bronze or iron body bronze mounted valves are recommended.

Where gate valves are specified for shut-off services, rising spindle types, which indicate wedge position, have been chosen.

The sturdy Jenkins Fig. 241 O.S. & Y. U-Bolt all-iron gate, is favored by engineers and contractors for corrosive brine systems. *Jenkins Fig. 106-A* renewable composition disc bronze globe valve is recommended for installation on individual coils, brine coil air vents, and for other regulatory services where accurate flow control and drop-tight closure are essential.

To assure efficiency in the job when planning any major piping installation, consult with accredited piping engineers and contractors, and select your valves from the Jenkins Catalog.

Enlarged diagram and full description of this layout No. 79 free on request to Jenkins Bros., 100 Park Ave., New York 17.

		Non-Corrosive Brines	Corrosive Brines	
Code	Quan.	Jenkins Valves	Jenkins Valves	Service
A	2	Fig. 651-A IBBM	Fig.241 All Iron Gate	Brine pump flow shut-off
AA	2	Fig. 142 IBBM	Fig.81 All Iron Globe	Brine pump flow control
AAA	3	Fig. 106-A Bronze	Fig. 75-A All Iron Globe	Brine pump pressure gauge
B	2	Fig. 624 IBBM	Fig. 85 All Iron Swing Check	Prevent backflow through brine pump
C	2	Fig. 651-A IBBM	Fig. 241 All Iron Gate	Shut-off chiller brine flow
D	2	Fig. 651-A IBBM	Fig. 241 All Iron Gate	Brine to rink shut-off
E	1	Fig. 142 IBBM	Fig. 81 All Iron Globe	Brine balance tank overflow control
F	1	Fig. 651 A IBBM	Fig. 241 All Iron Gate	Brine flow shut-off at tank
G	(1 each)	Fig. 106-A Bronze	Fig. 75-A All Iron Globe	Control brine flow in individual coil
H	(1/coil)	Fig. 47-U Bronze	Fig. 240 All Iron Gate	Shut-off brine flow in individual coil
J	(1/coil)	Fig. 106-A Bronze	Fig. 75-A All Iron Globe	Control brine coil air vents
K	1	Fig. 106-A Bronze	Fig. 81 All Iron Globe	Brine balance tank flow control
P	6	Fig. 106-A Bronze	Fig. 75-A All Iron Globe	Control brine drains

Code	Quan.	Jenkins Valves	Service
S	3	Fig. 47-U Bronze Gate	Shut-off condenser cooling water
T	4	Fig. 47-U Bronze Gate	Shut-off compressor cooling water
V	6	Fig. 106-A Bronze Globe	Control fresh water drains
W	1	Fig. 47-U Bronze Gate	Cooling water pump flow shut-off
WW	1	Fig. 106-A Bronze Globe	Cooling water pump flow control
WWW	1	Fig. 106-A Bronze Globe	Cooling water pump pressure gauge control
X	1	Fig. 92-A Bronze Swing Check	Prevent backflow through cooling water pump
Y	1	Fig. 106-A Bronze Globe	Control water supply makeup
Z	1	Fig. 92-A Bronze Swing Check	Prevent backflow into water supply

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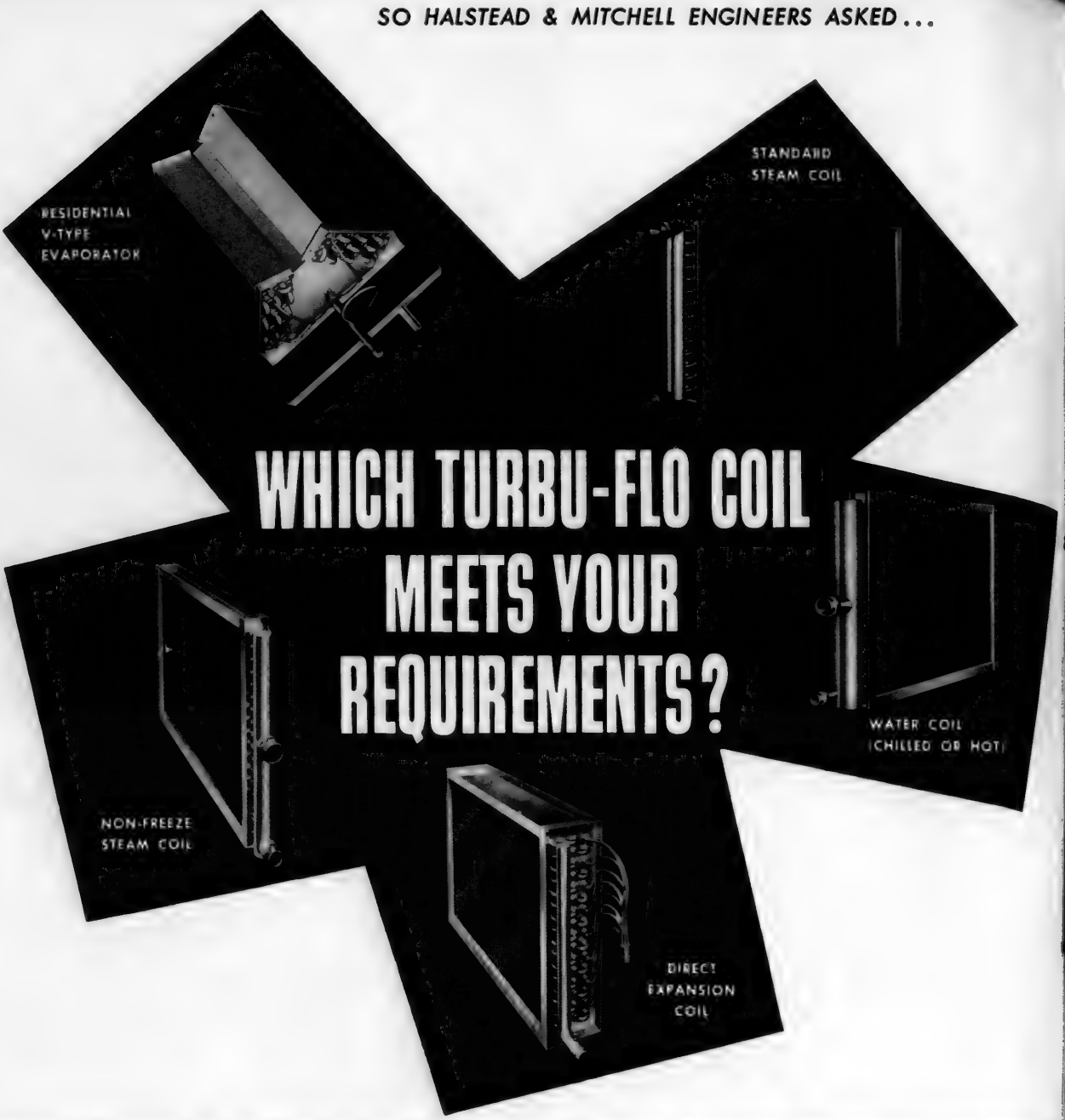

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HM Halstead & Mitchell

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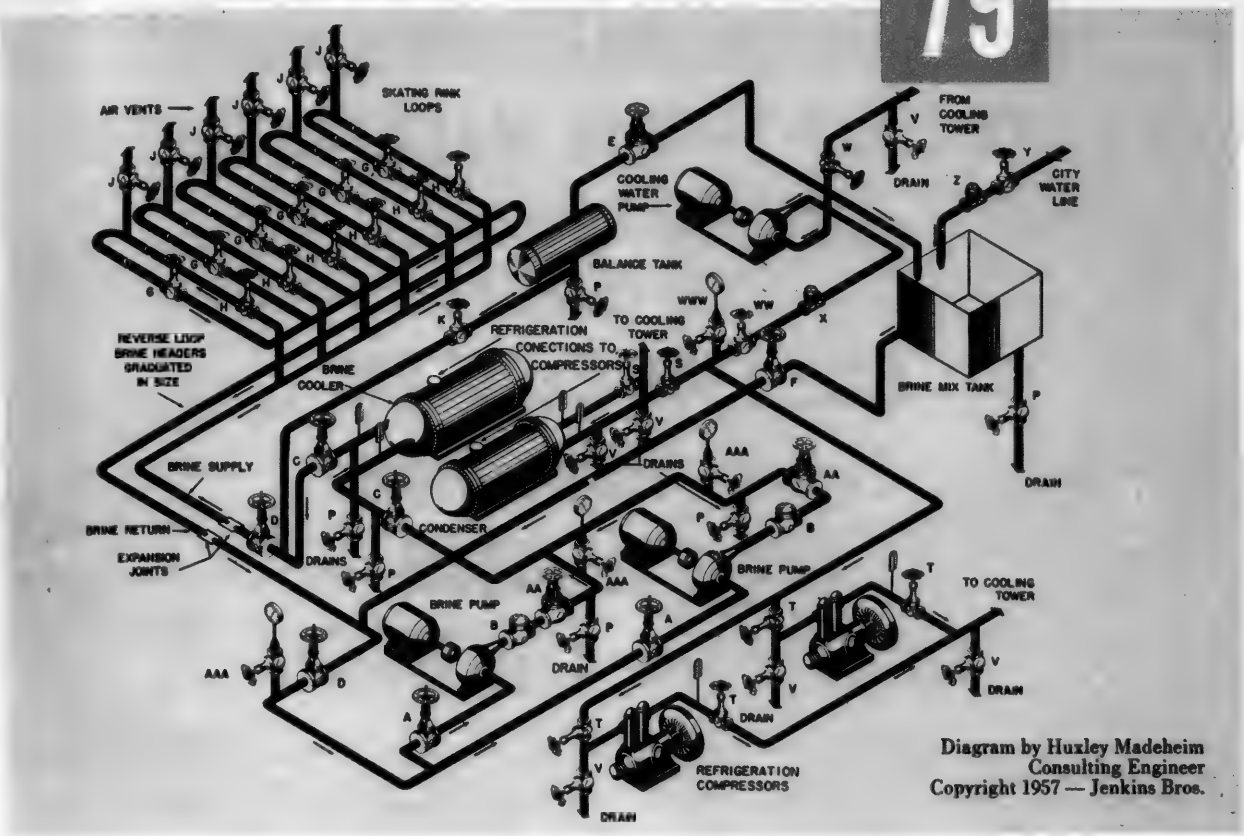

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WW	1	Fig. 106-A Bronze Globe	Cooling water pump flow control
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middle west,
southwest. On
the extreme nor
east will be
sweltering summ
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to have a chance to vo
issues which they think their
constituents favor. For
others, decisions will b
difficult.
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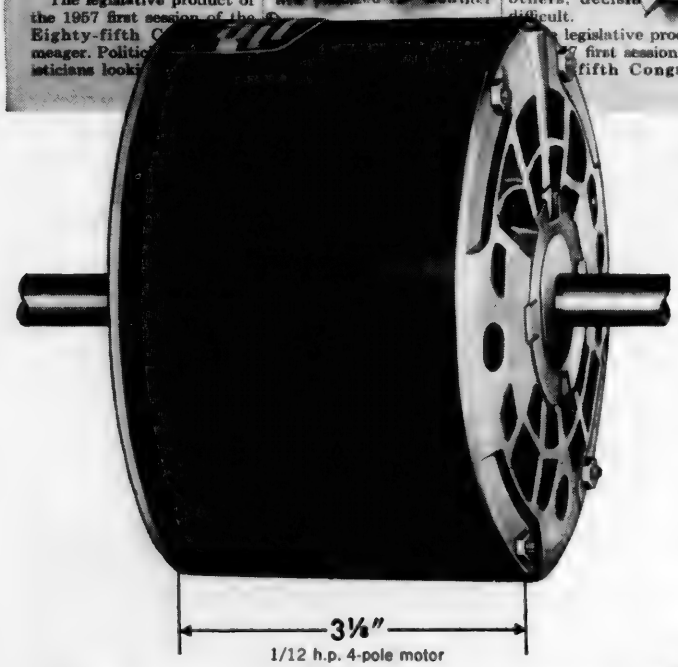
EMERSON-ELECTRIC Shrinks Motor Depth ONE FULL INCH for Your New Thin Models



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More compact . . . yet *without* loss of power! New Emerson-Electric shaded-pole motors have been reduced *one full inch* between the motor hubs. You will need these thinner motors in designing your new models!

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Since 1890

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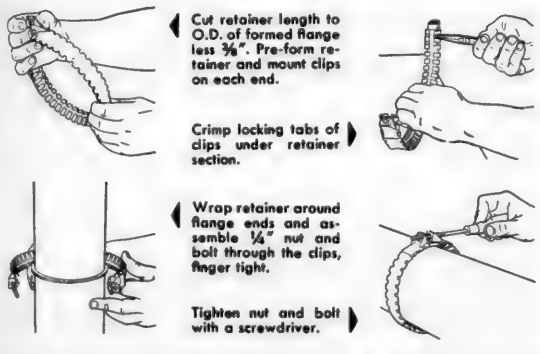
Ventiduct Coupling System

- Joins without welding or riveting
- Low cost . . . long lasting
- Easy to install
- Corrosion resistant stainless steel
- Adjustable to various diameters

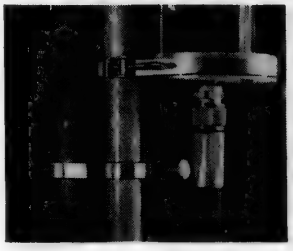
Eliminate all welding and riveting with Marman stainless steel Ventiduct* Couplings. Join heating, ventilating and air conditioning duct sections quickly and easily. It takes only minutes with pocket tools to assemble and install Marman Ventiduct Couplings.

Ventiduct Couplings assure solid joints, speed installation of duct work, cut costs and simplify inventory. A supply of 3-foot lengths meets large or small diameter requirements.

Ventiduct Flexible Coupling Installation Instructions


Cut retainer length to O.D. of formed flange less 3/8". Pre-form retainer and mount clips on each end.
Crimp locking tabs of clips under retainer section.
Wrap retainer around flange ends and assemble 1/4" nut and bolt through the clips, finger tight.
Tighten nut and bolt with a screwdriver.

Other Marman Products that Simplify Your Job



Universal Band Clamp The complete versatility of the Marman Universal Band Clamp on either circular or irregular shapes and for either permanent or temporary installation is shown in this installation of a circular sight glass and irregular shaped bracket.

Universal Flagmaster* attaches quickly and firmly to pipe or ducts for quick identification purposes. Stainless steel flag is attached to a stainless steel adjustable strap.

*Ventiduct and Flagmaster are Aeroquip Trademarks

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Please send information on
- ☐ Ventiduct Coupling System
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- ☐ Universal Band Clamps

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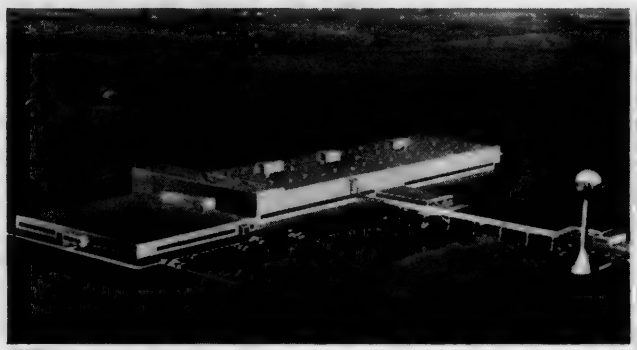
THE CROSS COMPANY—Fraser, Michigan
This automation equipment producer's new plant has two 12-million btu C-E Hot Water Boilers.



CONVAIR-ASTRONAUTICS—San Diego, California
New Convair space-flight research center will have two 30-million btu C-E Hot Water Boilers.

RIVERVIEW COMMUNITY HIGH SCHOOL—Riverview, Mich.
Two 10-million btu C-E Hot Water Boilers heat Riverview's recently expanded high school.

U.S. AIR FORCE ACADEMY—Colorado Springs, Colorado
Choice of five C-E units here typifies widespread Air Force acceptance of high temperature hot water.

HIGH TEMPERATURE WATER

today's new idea in large space heating

In such diverse applications as industrials, large educational institutions, and military bases, high temperature water is finding rapidly increasing acceptance as an ideal means of heating large areas.

A big factor in bringing this trend about is The C-E La Mont Controlled Circulation Hot Water Boiler. Using the same principle as that applied by C-E in many of the country's largest utility boilers, this new boiler provides a degree of temperature control that makes it the most attractive method of heating in many cases. With a wide range of capacities—from 10 to 300 million Btu's—these boilers operate at water pressures up to 500 psi and temperatures to 470F, or higher. A C-E Hot Water Boiler can save from 10 to 20 per cent in maintenance and operating costs.

Combustion Hot Water Boilers in the smaller capacity range are completely assembled in the shop while the intermediate and large units are shipped in varying stages of assembly. This C-E practice greatly reduces erection costs.

So, if you are in the market for boilers, either for space heating or process requirements, it may prove greatly to your advantage to investigate the use of high temperature water as your heat source. Because individual needs vary, both steam and hot water have their place. Our engineers will be pleased to discuss either method with you or your consultants—impartially and with no obligation.

For further details on high temperature water boilers by C-E write for our catalog HCC-2.

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C-120-B

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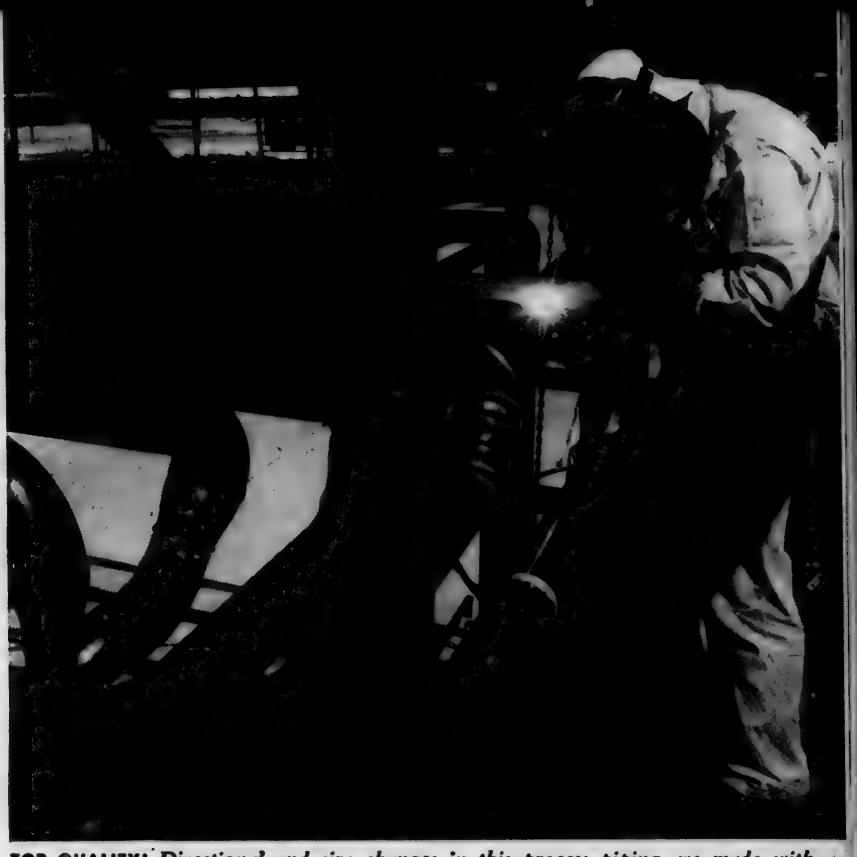
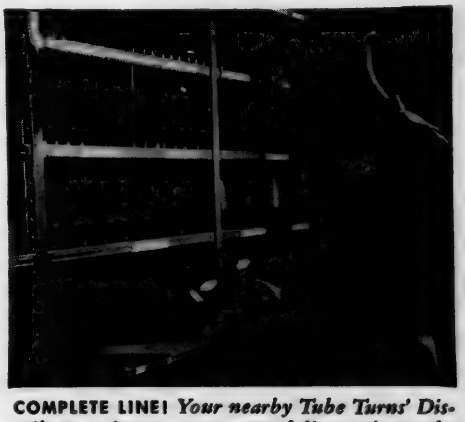
Safeguard your piping investment with known fittings!



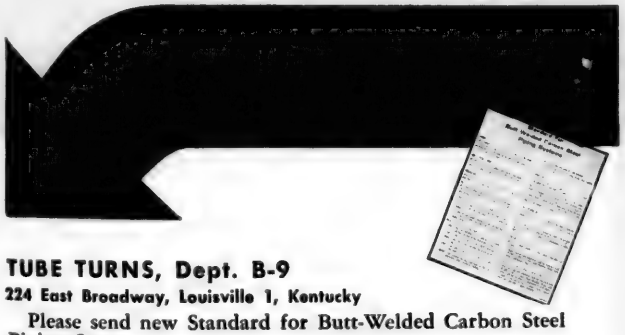
TOP QUALITY! *Directional and size changes in this process piping are made with TUBE-TURN Welding Elbows and Reducers . . . recognized for their unsurpassed uniformity and quality.*

The cost of fittings is a small fraction of the total cost of a piping system. To buy "cheap" fittings and run the risk of impairing the performance of your entire system can, therefore, be "penny wise and pound foolish."

When you specify and buy TUBE-TURN* products, you know your investment is safeguarded by unsurpassed quality of fittings and flanges. They meet all American Standard and Safety Code requirements. Each product is permanently marked with complete size and material designation.



COMPLETE LINE! *Your nearby Tube Turns' Distributor gives you prompt delivery from the complete line of more than 12,000 Tube Turns' stocked items. Photo courtesy The Ross-Willoughby Co., Columbus, Ohio.*



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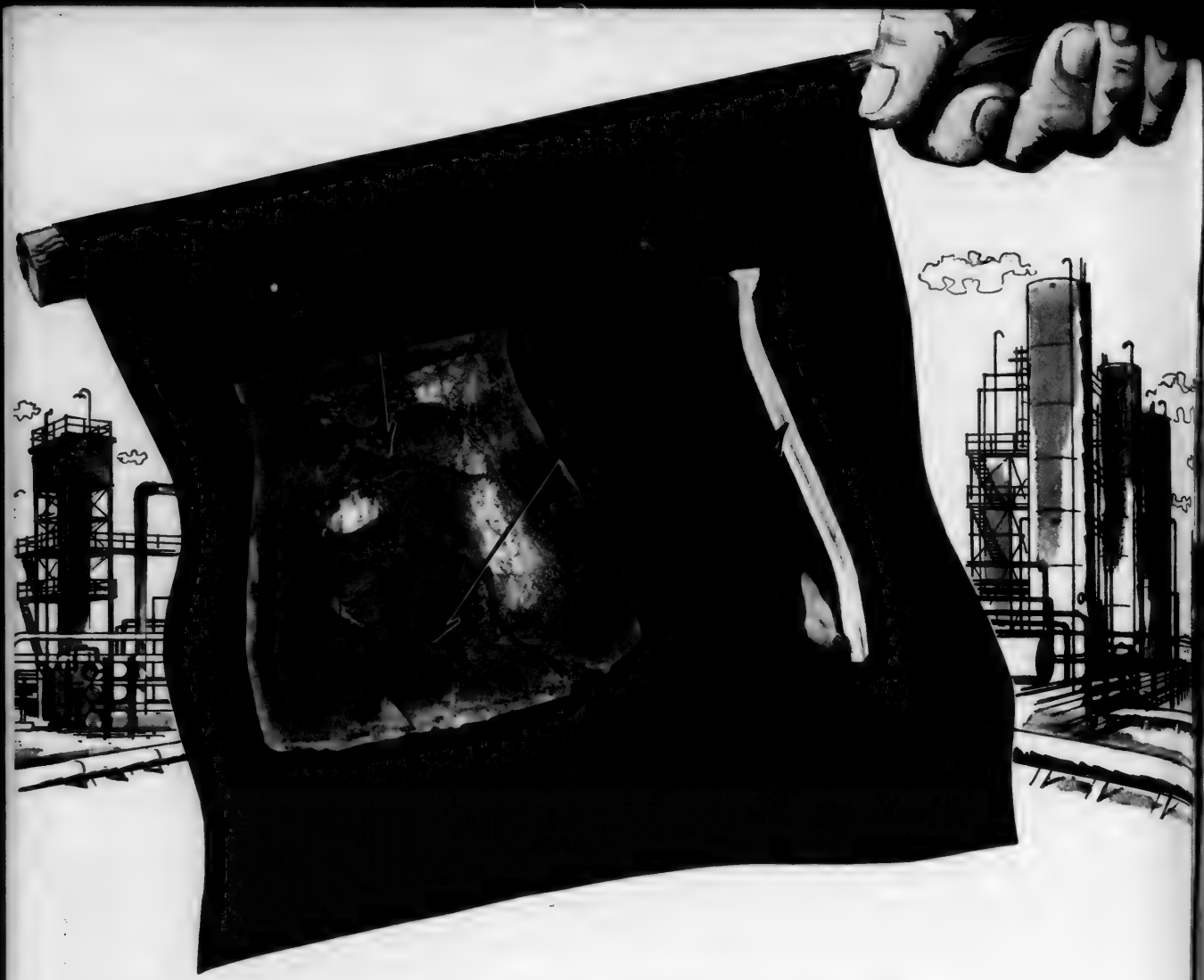


Watch out for the after-costs of Question Mark fittings!

Unknown fittings may look like a bargain on the price tag, but watch out for the consequences!

Surface defects led to the above "Question Mark" fitting being cut from the piping. Further examination showed the steel inside was laminated. Pieces cut out literally fell apart. Here was an open invitation to serious trouble . . . lost production, wasted dollars and possible human casualties.

This is another example of a dangerous situation posed by unknown fittings of questionable quality . . . a serious threat to the safety and economy of well-engineered piping.

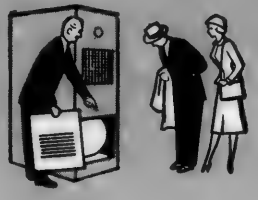
You can avoid these risks by specifying KNOWN fittings!

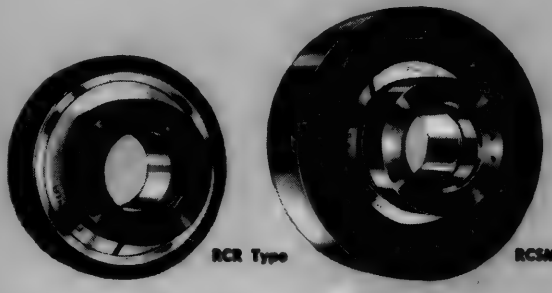
DANGER! *Your first warning of Question Mark fittings is their lack of complete, permanent identification of manufacturer, wall thickness, weight, material . . . as required by A.S.A. code.*

A message in the interests of top quality piping
. . . by Tube Turns, Louisville, Kentucky

QUIETER TURNOVER HERE . . .

GIVES YOU QUICKER TURNOVER HERE . . .





RCR Type

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SUPER QUIET **FAFNIR BALL BEARING**

RUBBER CYLINDRICAL CARTRIDGES

for
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Super-quiet, maintenance-free performance, plus low cost and superior design features make these Fafnir Ball Bearing Units an excellent, economical choice for household air conditioning equipment — or for any equipment where quieter operation can increase sales appeal and customer satisfaction.

Fafnir Rubber Cylindrical Cartridges are equipped with RA-PP Type Super-Quiet Ball Bearings. These bearings feature balls and races specially-finished for extra-silent service. They are pre-packed with long-life lubricant, factory-filtered to reduce friction, wear, and noise, and to extend bearing life. Housed in electric current-conducting rubber grommets, they require no metallic grounding springs or clips.

Fafnir RCSM TYPE CARTRIDGES are specifically designed to interchange with other makes of ball bearing rubber-cushioned cartridges, while RCR TYPE CARTRIDGES, available in sizes to fit standard type sleeve bearing brackets, make replacement of ordinary sleeve bearing mountings easy and economical. Write for detailed information and specifications. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR
SUPER QUIET
RA-PP TYPE
BALL BEARING

Balls and races specially finished for super-quiet performance.

Extended inner ring for greater shaft support.

Self-locking collar for easiest assembly . . . securely locks bearing to shaft with mere twist of wrist.

Patented Plya-Seals that positively keep dirt out, lubricant in. Bearing is pre-lubricated with correct amount of long-life, factory-filtered grease. Relubrication is never required.

SEND FOR THIS six-page bulletin containing detailed information, including dimensions and load ratings, of Fafnir's complete line of super-quiet ball bearings and rubber-cushioned ball bearing units.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

THIS IS WHAT

ADSCO

MEANS BY

SPECIAL

JOINTS

The photo shows a small but very important section of an insulated, spring-suspended 8″ pipe line in the new Moundsville, W. Va., plant of the National Aniline Division of Allied Chemical & Dye Corp. At the point shown, the line is subjected to complex stresses which are completely resolved and placed in balance by the ADSCO Gimbal Expansion Joint, upper left, and the ADSCO Hinge Expansion Joint, lower right.

In the Gimbal Joint, two sets of bars are pinned to the octagonal ring at 90° to each other. The other ends of the bars, still at 90° to each other, are pinned to the pipe leading into the joint. Running through the center of the ring, with a slight clearance, is a nipple connecting two expansion elements. This gimbal arrangement permits the joint to absorb 6° of angular movement from two different directions: the left and right motion of the horizontal part of the ell and similar motion from other unseen upper horizontal piping at 90° to the plane of the lower piping.

A partner to the Gimbal Joint and an indispensable part of this piping system is the Hinge Joint shown lower right. This absorbs the angular rotation of the ell caused by the expansion and contraction of the vertical piping.

There are so many motions involved in this section that, under certain conditions, the octagonal ring of the Gimbal Joint could describe a circle. Yet ADSCO and National Aniline engineers were able to identify all the motions and absorb them economically and efficiently by the Gimbal and Hinge Joints.

ADSCO designs and manufactures many types of both standard and special joints for many purposes. Consult ADSCO on any piping problem.

ADSCO DIVISION
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man may reach the moon

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Superior Steam Generators encompass the most complete line of packaged boilers available. Write for complete details today.

Fire Tube types to 600 b.h.p. (Write for Catalog 719 F).

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Man will reach the moon . . . tomorrow perhaps . . . but more than likely "tomorrow" in the dictionary of scientists means 20 years . . . and that's a long time to pay the penalty of high steam costs. A boiler is a long term investment; and the equipment you buy today determines your steam costs for years to come.

Superior Steam Generators are designed and built to last longer, and to operate at higher efficiencies throughout their entire serviceable life. Evidence of this you can see for yourself in Superior's bigger, heavier construction and completely integrated design. Superior Steam Generators provide more steam per dollar over a longer serviceable life.

for performance you can **BANK** *on*

SUPERIOR COMBUSTION INDUSTRIES INC.
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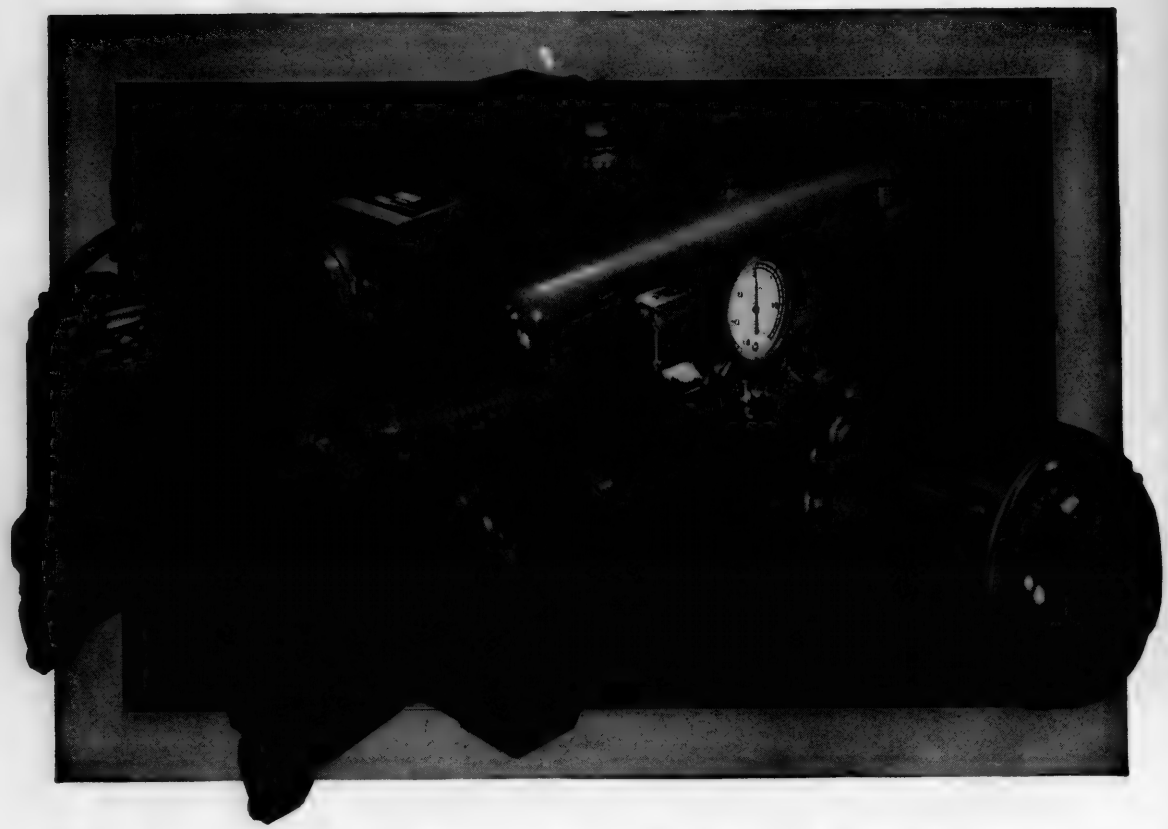
SUPERIOR
STEAM GENERATORS

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS



It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

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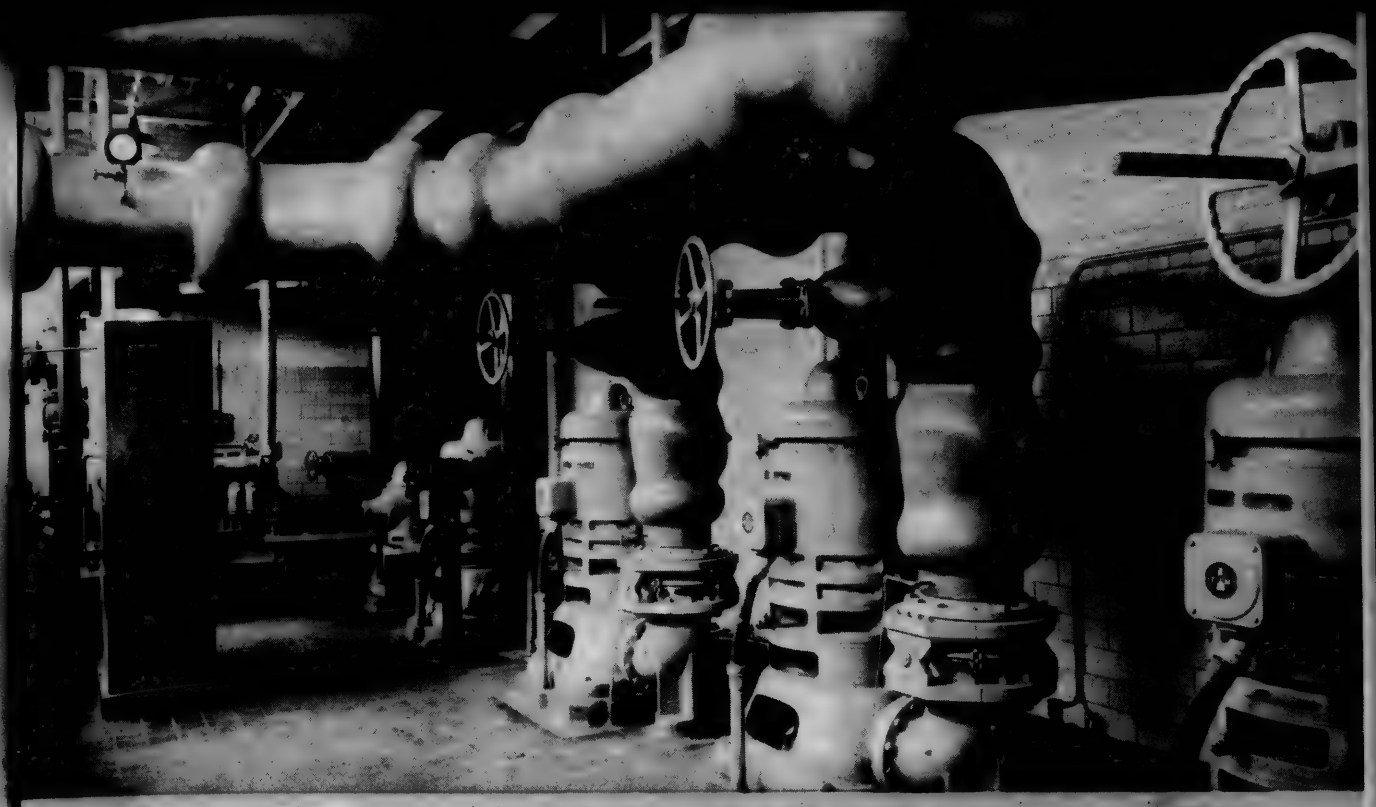


Domestic water and fire protection room, Spring and Bumper Plant, Chevrolet Motor Division, General Motors Corp., Livonia, Mich.

Water Supply for Industrial Plants

J. NACHBAR

Mechanical Engineer, Albert Kahn Associated Architects & Engineers, Detroit, Mich.

During recent years, there has been a pronounced overall increase in the use of water. The ever greater volumes of water required by the industrial user have greatly contributed to this increased water consumption. It is the purpose of this article to review some of the principal considerations in the design of the water supply systems required for large industrial plants. Industries such as steel, petroleum products, paper and aircraft are among the largest water consumers. Water is mainly used for process work, as a cooling agent, as a solvent, catalyst, for conveying materials, as a cleansing agent, lubricant, and for fire protection and lawn sprinkling. In addition, it serves the sanitary demands of plant population.

THE availability of water is one of the primary factors in the selection of a site for a new plant. Depending upon the circumstances, it can be obtained from the following sources: Municipal or otherwise public utilities; privately-operated water companies; from wells on the plant property; from a lake or river, or from artificial lakes or ponds constructed for collection of rainwater to be used for plant needs. Occasionally, water for a plant can be supplied from a combination of the sources enumerated, depending upon the demand for potable and non-potable water. If both kinds of water are to be used in a plant, then they must be separated in independent distribution systems for reasons of health and in order to conform to the requirements of applicable codes.

When considering the supply of water from an established water company, a number of factors must be investigated. These can be grouped into five categories: Quantity, quality, available pressures, reliability, and cost.

Before approaching the supplier of water, an estimate must be made of the anticipated volume required. To do this, figures must be calculated for an average daily flow, short period peak flow, and for fire emergency flow. Other factors to be considered include: Plant population per shift and the number of shifts worked; process water demands, if these are to be satisfied from the same source; boiler make-up requirements; lawn sprinkling and other special needs. The relation of the daily flow to peak flow will be greatly affected by the planned on-site storage capacity. The actual size of piping selected to deliver water to the site will be determined by the peak flow required by the proposed plant and by other possible customers. In addition to these considerations,

careful attention must be paid to the planned or anticipated future plant expansion and development.

Industry Moves to Undeveloped Areas

In recent years, in order to acquire the large open areas required for one-story plant construction and the necessary parking lots, industry has had to locate considerable distances from established public water distribution systems. As a consequence, negotiations for new pipelines extending for miles from the established water sources have become the rule rather than the exception. This involves considerable capital investment for the new facilities which, regardless of the financing arrangements, will be paid for by the industrial consumer over a period of time. If, as is often the case, these new facilities are to be financed by revenue bonds, the consumer will be requested to guarantee to the water company a minimum water usage in order to retire the bonds on schedule. The size and cost, therefore, of the supply line must be carefully weighed against the cost of providing adequate storage on site to handle the anticipated peak demand.

Quality-wise, water, in order to be used for domestic purposes, must be clear, palatable, free of organic matter, bacteriologically safe, and it must not vary greatly in temperature throughout the year. Most of these conditions are automatically satisfied when water is purchased from an established water supply system. Provision in the plant for some special treatment may be required for water used for boiler make-up and occasionally, depending on the water hardness, for hot water.

The expected water pressure at the plant site will determine, to a great degree, the design of the system to be used. Some of the questions to be considered prior to design of the system are: If elevated storage is planned, will the pressure be sufficient to fill the tank without employing booster pumps in the plant? What are the variations in pressure expected throughout the year? If pumping is required, will it be acceptable to the water company to pump directly from the main, or will on-ground or underground suction storage be necessary? The variations in pressure will determine whether pumps will be required in everyday operation or just as an emergency standby.

Is the Supply Reliable?

Checking into possible pressure variations on the supply main leads directly to investigation of the overall reliability of the supply system delivering water to the site. It is highly desirable that the supply be looped or, in other words, that the main passing near the property be ready to receive water through two or more different routes. If this is done, a steady supply of water is assured even if a break occurs in a part of the supply distribution system. Unfortunately, because of the remote location of most new industrial plants, a looped water supply is rarely obtainable. Generally, a plant is located along or at the end of a branch line of the system. The longer the line, the greater are the chances of a break with the resulting temporary interruption in the supply of water to the plant involved.

Frequently, to satisfy a new large industrial customer, the water company must make revisions or additions to the existing system to provide the necessary pumping and storage capacity. If new pumps are to be added in the water works, the consumer should make inquiry as to the method to be employed in controlling the new pumps. This will have a direct bearing on the pressure variations to be expected at the plant site. These variations and possible surges can be greatly reduced if elevated storage is provided as part of the water works installation.

Occasionally, when a new supply line is installed to serve, initially, a single industrial plant, an attempt is made to rely on the storage tanks on the plant site to control the pumps in the water works. Such an arrangement should be discouraged, as internal plant operations may frequently interfere with the control set-up of the pumps at the water works.

The reliability of the water supply to the plant will be affected further by existing or expected future large industrial customers served from the same main. An inquiry should be made as to whether some binding flow restrictions are planned for all large consumers on the supply line.

Water Must Be Metered

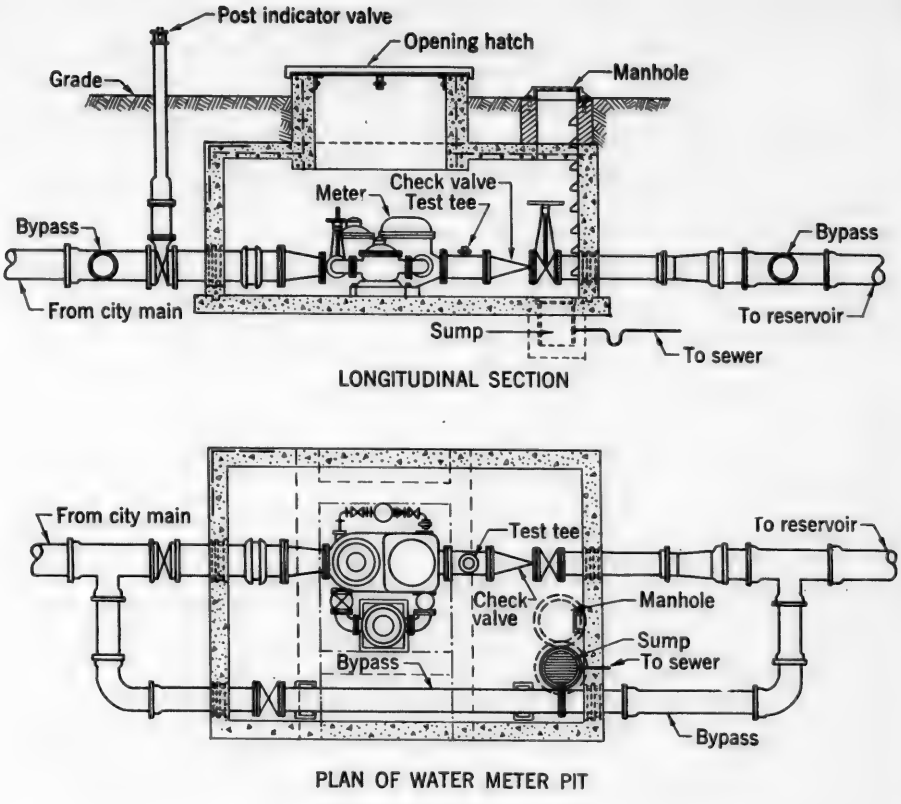
While negotiating with the water company, definite requirements and regulations for metering the water should be secured. Having estimated the probable flow to the plant, it is advisable to clear the following questions with the water company prior to starting the design of the metering installation. Is the metering installation to be furnished and/or installed by the water company or the customer? What is the acceptable maximum size of meter or meters? What is the minimum required accuracy of the meters? Is the bypass connection to be provided with a meter? What types and makes of meters are acceptable? What test outlets are required? Are rate of flow controllers insisted upon?

Frequently, a direct checked connection is provided from the supply main to the underground fire protection system. This can be made at one or more points along the supply main or on the incoming line in the water pit. In certain localities it is not necessary to meter the water used for fire extinguishment; in others the water used for fire protection must be metered. In the latter case, separate fire meters may be required. These may be installed together with other meters in the meter pit or in separate connection pits. At this stage in the planning it is well, also, to determine the exact point at which the installation by the water company will end and that of the customer begin.

The question of access to the meters poses problems under certain circumstances. Generally, the water main is brought to the property along a public road bordering a fenced-in plant site. The meter pit, located near the main on the plant property may be several thousand feet away from the actual plant or the nearest plant road. In order to facilitate access to the meter pit from the outside road, it has proved practical, in some instances, to fence in the pit and provide two gates, one from the outside and one from inside of the property. The water company representative holds a key to the outside gate, which permits him to read the meters without having to enter the plant site.

In addition to meeting the minimum requirements of the water supplier with regard to the meter vault, installation of water strainers ahead of the meters should

Details of a water meter pit.



be considered in order to protect the meters and pumps from grit and debris which occasionally finds its way into the water main.

Water May Be Obtained From Wells

Wells on the plant property are the usual alternate source of water in instances where the new plant is built in an area which makes it economically, or otherwise, not feasible to obtain water from an outside supplier. When acquisition of a site in such an area is under consideration, an investigation should be made as to whether there are indications that a satisfactory well water supply can be established. If large water producing wells exist in the area, information should be secured as to their capacity, depth, earth formations encountered, drawdown, stability of water level over the years, and quality of the water obtained. Pertinent data can be obtained, usually, from leading local drillers and from the U. S. Geological Survey authorities. Unless no doubts exist that a satisfactory water supply can be found at any point on the property, test wells, together with observation wells, should be drilled.

An electrical earth resistivity survey is a valuable aid in choosing the most favorable location for test and for permanent wells. Such a survey provides a record of the nature of undisturbed formations and is based upon the fact that each type of earth material possesses its own characteristic electrical resistivity. The results of a resistivity survey, as interpreted by a qualified geologist, is a valuable guide to drilling in areas where there is a better than average probability of a successful well.

Other Sources

For plants using large quantities of water for process or cooling, it is desirable to provide separate sources of non-potable water. If a plant is located near a river or lake, an investigation should be made of the possibility of obtaining water from such river or lake. Frequently, artificial storage ponds can be dug on the plant site. These are filled with storm water throughout the year. The water is used as needed in the plant and, if possible, recirculated to the ponds for cooling and settling of impurities. These reservoirs frequently are designed for multi-purpose use. They can serve as temporary reservoirs for concentrated rate of storm water run-off following heavy rainfalls, also as reservoirs for water to be used in the event of emergencies such as fire.

Storage on Site

Storage of water on a plant site is provided in order to have huge quantities of water available when the need arises. Storage also permits equalization of the rate of flow from the water supplier or, when pumps are employed, to equalize the rate of pumping over a 24-hour period. The more vulnerable a supply line to the plant, the more important an adequate storage capacity on the plant site. To determine the necessary reservoir capacity, the following factors should be considered: The peak and average demands; the reliability of the supply line; cost of interruption of production due to possible break in the supply line; quantity of water needed to fight a major fire, and last, but not least, the cost of constructing storage facilities.

Storage reservoirs may be located underground, on the ground, or they may be of the elevated type. Any of these types of storage, or a combination of them, can be used in industrial installations.

Underground storage may be selected by the designer

when large quantities of water are to be stored on the site. Occasionally, very low incoming water pressure may dictate the use of this kind of reservoir. If potable water is to be stored underground, the reservoir is generally constructed of reinforced concrete in which case the top slab extends above the surrounding ground level to prevent the stored water from coming in contact with the surface water. This type of reservoir is particularly adaptable for installation of vertical type pumps for supplying the plant. By suitable design of baffles in the reservoir, the required quantity of water can be held in reserve for purposes of fire protection. This fire protection reserve is very important.

Underground storage facilities for non-potable water frequently consist of open basins with self-supporting banks or open reinforced concrete basins.

On-ground storage is often dictated by fire protection needs in order to have a sufficient quantity of water available in case of emergency. This method of storage is an absolute necessity when the plant is located at the end of a long supply line and is primarily dependent on its own fire fighting capacity. When a plant is located in such a remote area, it is advisable to consider erection of dual purpose ground storage capacity with part of the water reserved for fire protection and the balance used as reserve for plant operation. In particularly vulnerable locations, or where exceptionally large quantities of water are used, separate ground storage tanks for domestic water use may be provided.

In most instances, ground storage tanks are made of steel plate, although tanks of reinforced concrete or prestressed reinforced concrete are sometimes found suitable. These tanks are generally erected in pairs in order to permit the emptying of one tank for repairs and maintenance, with the minimum required reserve retained in the other tank. Fire protection and domestic water pumps take their suction from these tanks and discharge into their respective distribution systems.

The most desirable and, at the same time, most costly per gallon of stored water is the elevated tank storage. This type of storage is, moreover, the most dependable as, in accordance with needs, it furnishes water at the required pressure, thus relieving the system of vulnerability to temporary loss of power. This dependability is limited, of course, by the quantity of available and usable water in the tank.

The height of the tank is determined by the required pressures in the distribution systems. In industrial applications, the height varies generally from 100 to 125 feet to the bottom of the tank. Occasionally, if a plant is located near approaches to an airport, the height of a tank serving the property may be restricted to avoid interference with air traffic.

Similar to the ground storage tanks, elevated tanks usually serve dual purposes, providing water for fire protection in addition to a domestic water reserve. By using a tank with a horizontal watertight steel partition, potable water may be stored in the upper compartment and non-potable water in the lower compartment. Thus the tank may perform a triple service by providing storage for domestic water, for fire protection, and for process water. In addition to providing storage and to equalizing pump operation, the elevated tanks effectively minimize water hammer problems by acting as surge tanks on a pump system.

Location of Tanks on Site

The location of water tanks on the property depends on several factors, the most important of which are: The kind of proposed storage and the distribution system involved; general appearance of the developed site; location of the power house; proposed location of main mechanical and electrical services; ease of maintenance, and special conditions peculiar to a particular project.

The available or expected water supply to the plant and the water demand in the plant will dictate the kind of storage and distribution system to be used. Appearance considerations will eliminate certain portions of the property as a possible location for the tanks.

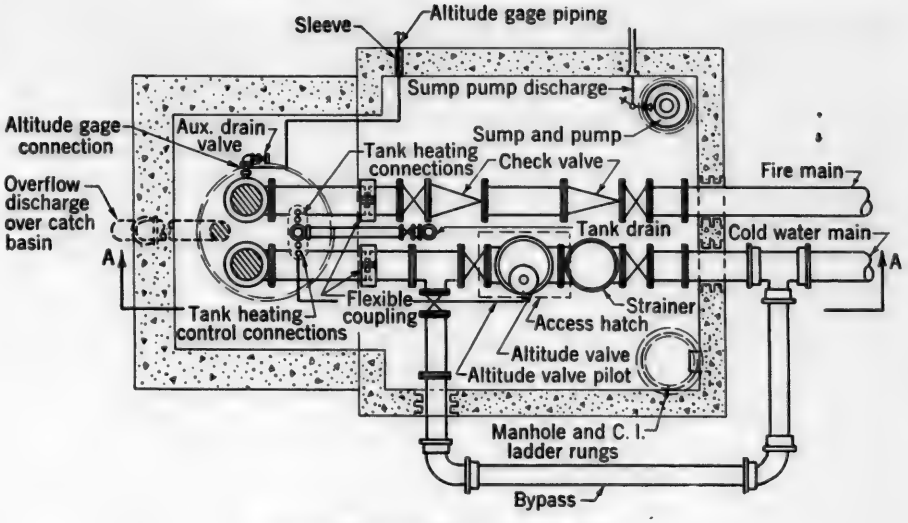
If, as is frequently the case, ground and elevated storage are planned, the system may consist of the following components: Ground storage tanks and fill installation; pumps taking suction from the ground storage tanks; a distribution system; elevated tank with connecting piping, and controls. In an installation of this nature, the pump should be located as close to the suction tanks as possible. This can be accomplished by either building a separate pumphouse at the tanks or, if the pumps are to be located in the power house, by erecting the suction tanks nearby. There is considerable advantage in having the pumps located in the power house as this places them under constant supervision by qualified personnel. This location is desirable, also, because of the electric power readily available for the pumps and because steam is available for heating the tanks in winter without the installation of long and costly service conduits. The only disadvantage to installing pumps in the power house is the fact that such an installation makes selection of the site for the ground suction tanks much less flexible than is the case where a separate pump house is constructed.

It is good practice to install ground suction tanks a reasonable distance from an elevated tank. This is to make the supply system more flexible. In case of a break in a fire loop, a portion of the broken main can be isolated by closing sectional valves and the system can be supplied from different points on the site. This practice also insures that both reserve sources of water will not be exposed simultaneously to fire hazard. In addition, special considerations, such as protection from possible sabotage or warlike actions, may dictate, insofar as possible, widely separated locations for the two kinds of storage. The final decision regarding location of the elevated tank is generally a compromise between these safety considerations and the cost of extended mechanical and electrical services to the tank. These services involve domestic water and fire protection lines, steam and condensate conduits for winter operation, storm sewer for tank overflow and drainage of the pit under the tank, and finally electrical lines for control wiring, cathodic protection of the tank and lighting. A remote location for an elevated tank is likely, also, to result in less than adequate periodic supervision and maintenance.

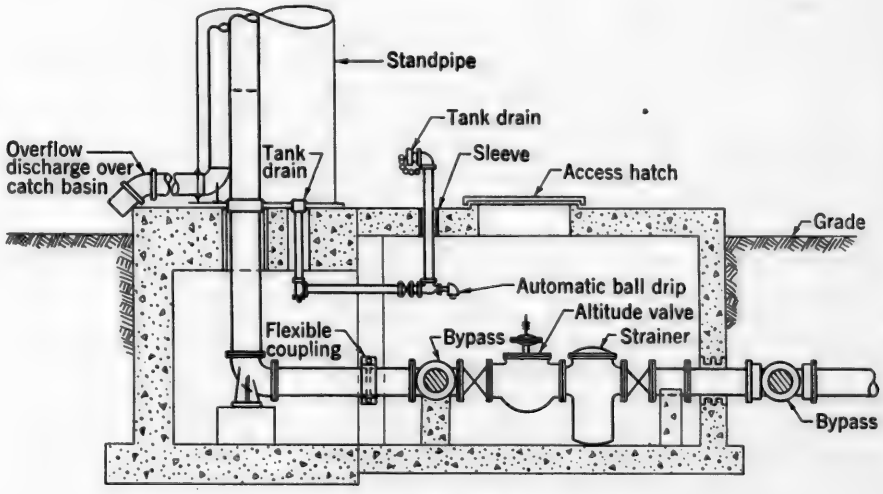
Filling Of Tanks

The method to be used in filling the tanks depends to a large extent on the available water pressure in the supply line. Following are the conditions likely to be encountered: (1) Pressure too low to fill ground suction tanks; (2) pressure sufficient to fill ground suction tanks; (3) pressure which varies and is not reliable at

Details of an elevated tank valve pit.



PLAN OF ELEVATED TANK VALVE PIT



SECTION A-A

all times to fill the suction tanks; (4) pressure high enough to fill the ground storage tanks but too low to fill the elevated tank; (5) pressure sufficient to fill the elevated tank at all times; (6) pressure variations which will permit filling of the elevated tank at certain times only.

In condition (1), low head pumps are employed to boost the pressure in the supply line sufficiently to force the water into the suction tanks. The pumps are usually controlled automatically and operate in steps depending on the water level in the tank. Water reaching the overflow level automatically stops the pumps, thus arresting the flow into the tanks.

Under condition (2), with the supply pressure high enough to fill the tanks whenever required, obviously no low head pumps are necessary. In order to prevent the tank from overflowing, an automatic altitude valve is installed in the fill line to the tank. This valve is of the single acting type which permits flow in one direction only. It will automatically close the fill line when water in the tank reaches the desired predetermined level.

With water pressure varying, as in (3), a combination of conditions (1) and (2) exists in which case an installation is provided whereby low head pumps are furnished with a checked bypass and an altitude valve. The pumps are controlled to cut in only when pressure on the suction side falls below a pre-set point.

High head pumps are provided whenever the supply pressure is too low to satisfy the plant demand and to fill the elevated tank. These pumps take their suction from the ground suction tanks, if these are provided, or directly from the supply main. It is advisable, and in some cases imperative, to control these pumps from the water level in the elevated tank. Even with the existence of ground storage tanks, it is desirable to install a connection to permit bypassing of the tank. Such a bypass will allow pumping directly from the supply main in the event of emergency when the suction tanks may, for some reason, be out of order. This arrangement should be cleared with the water supplier, as there may be objections to such an installation, depending on the capacity of the high head pumps.

On the rare occasion when water pressure is sufficiently high or higher than required to fill the elevated

tank, it is a matter of judgment whether to provide any high head pumps. These pumps, if installed, could serve as standby protection in the event of a prolonged break in the water supply to the plant. The pumps may be started either manually or automatically when the water pressure in the supply main falls below a predetermined amount. An altitude valve will stop flow into the tank when water reaches the overflow level. Pumps, if any, can be controlled by the level of water in the elevated tank.

With variable supply pressure, an arrangement similar to the one described above for the low head pumps may be used by employing a bypass around the high head pumps plus an altitude valve. The altitude valve at the elevated tank may be either single or double acting. In the former case, separate inlet and outlet lines to and from the tank may be required. When a double acting altitude valve is employed, a single water supply riser is provided to the tank, with water flowing in either direction. The valve will close automatically to prevent the tank from overflowing.

Refreshing Water in Storage

Whenever potable water is stored for any length of time, means of refreshing the water must be provided. For changing the water in standby ground suction tanks, for example, a small pump with suitable piping may be provided to supply the night-time demand of the plant from the tanks. The best means of refreshing the water in an elevated tank is to install independent inlet and outlet risers. The tank can be refreshed, also, with a single riser arrangement by properly stepping the pump operation so as to permit a partial supply to the plant to come from the tank. When no pumps are provided, the same result can be obtained by using an altitude valve with a differential pilot. Such a valve will close the supply to the tank at overflow level but will not open until water level in the tank is partially lowered. Other means also may be employed, such as periodic closing of the main water supply and temporary feeding of the plant from the elevated tank.

The actual piping connections to the tanks depend on whether the tank is of the single service type or of the more frequently encountered dual service variety. In the latter case, a certain quantity of water is always reserved for fire protection needs. The fill and domestic outlet pipes are extended above the reserve level, while the fire protection line is connected to the bottom of the tank. In the case of the ground suction tanks, this pipe forms a suction line to the fire pumps. At the elevated tank it is connected through a check valve to the underground fire protection loop. In addition to the main inlet and outlet pipes, the tanks include provision for controls, drain piping and, except in warm climates, connections for heating coils and thermostats. All connections to the tanks should be equipped with flexible couplings to afford protection in case of the movement of pipe in relation to the tank.

Pumps

Electrically driven centrifugal pumps, whether of the horizontal or vertical type, are generally used in water supply systems for industrial plants. Diesel motors are used as a standby source of power for critical services such as fire protection.

Vertical pumps lend themselves particularly well for pumping from underground reservoirs, pits and wet wells. Their great advantage is in the small floor space they occupy. They generally do not present any priming problems and do not have to contend with suction lifts. Vertical deep well turbine pumps are used when water is obtained from wells. Such pumps closely approach or equal the horizontal pumps in their efficiency, and their cost is comparable.

In the horizontal type large capacity units, pumps with horizontally split casings are most commonly used. Their great advantage lies in the ease of access afforded for maintenance and repair purposes. By removing the upper half of the casing, good access is afforded to the impellers, bearings, stuffing boxes and other parts which are subject to wear. These pumps, however, require considerably more floor space than their vertical counterpart due to the suction and discharge piping connecting to both sides of the lower half of the casing.

The selection of the pumps begins with a study of the plant average and peak demands. The proposed distribution system is outlined and a system friction curve for different flows is drawn. The analysis of the plant water needs suggests the number and approximate capacity of the pumps required. The head capacity curves for the proposed pumps are superimposed on the friction curve diagram in order to establish the expected operating points of the pumps. The intersection of both curves will reveal the pump delivery, head, efficiency, and power demand. The expected behavior of two or more pumps working against the same header is examined. Occasionally better flexibility of operation may be obtained by selecting pumps of different capacities in the same installation. This is particularly true when only limited storage is available on the plant site.

In water systems containing elevated storage, it is advantageous to select pumps with steep head capacity characteristic curves. An additional pump with a steep curve, when cut into the system, will substantially increase the total delivery of the installation. A pump with a steep characteristic will also minimize the variations in delivery when pumping against different levels of water in the elevated tank.

Special care should be taken in selecting the speed of pumps. The lower cost of smaller units operating at high speed should be weighed against disadvantages such as excessive noise and vibration, more frequent bearing troubles to be expected, increased danger of cavitation and generally greater wear of the pump. A happy medium for water pumps used in large industrial plants is 1800 rpm. Special conditions, however, may require different speeds. Squirrel cage induction motors are most frequently used as pump drivers. The size of the motor should be such as not to overload it at any operating point of the pump characteristic.

Controls

Controls, whether manual or automatic, are of utmost importance in any water supply system. The need for improved service and for reduction in labor costs weigh heavily in favor of automatic controls. In order to be effective, the controls must be dependable and render trouble-free service over a reasonable period of time. The most commonly used water controls consist of hydraulic and electric components linked in one system.

The function of these controls is to initiate and supervise operation of pumps and valves and to furnish necessary information concerning the water supply of the plant.

Apart from the shut-off valves installed to either open or close the flow of water, other valves, serving special purposes, are used throughout the water supply system. Of these, check valves are most commonly used in water installations. Check valves used on the discharge side of pumps should be of the non-slam type. On very large installations, where serious water hammer problems may arise, check valves with controlled speed of closing should be used. These valves, usually hydraulically operated, have solenoid pilot line controls to permit adjustment in the speed of opening and closing of the valve. The pump starts against a closed check valve. When pressure on the inlet side of the valve reaches a pre-set amount, the valve begins to slowly open thus avoiding surges in the system. Before pumps are to be stopped, the valve begins to close at a predetermined rate thus gradually cutting the flow in the pipe. With the valve practically closed, a switch stops the pump motor automatically. The check valve used for this purpose can be of the cone, ball or, at times, of the globe type. A controlled speed check valve can greatly contribute to the protection of the system from water hammer.

In addition to such valves, relief valves are occasionally used to relieve extreme pressures in the system caused by either surges or other conditions. Pressure reducing valves are used when the available pressure exceeds the desirable pressure at any portion of the system. They maintain the required pressure on the outlet side of the valves. In addition, these valves are frequently used on the incoming water service main, when the pressure in the main is excessive for plant use.

Pumps can be started or stopped by responding to different changes in the system, the most important of which are changes which occur in pressure or water level. Pressure switches connected to a pipe on the discharge side of the pumps will start or stop them at pre-set pressures. This kind of control must take into account the friction losses in the system. An allowance for this friction must be made in determining the cut-in and cut-out points of the switch. Inasmuch as friction losses vary with the flow, accurate and permanent setting of the pressure switches may prove to be difficult.

Water level in an elevated tank can be the controlling element for starting or stopping the pumps and opening and closing of valves. Level changes may be sensed by floats or electrodes suspended at different elevations in the tank. Float switches or electrode relays then transmit electrical signals to the controlled equipment. The water level can be measured also at the foot of the tank by the corresponding static pressure at this point. It is recommended in this case that a separate static line from the tank be used for actuating the pressure switches. Connecting the switches to the supply pipe at the tank may result in faulty static pressure readings because of surges on the line and pressure variations with the flow.

Typical Control System

In a typical installation, where the pumps are controlled from the level in an elevated tank, the controls consist of three basic components: A transmitter at the base of the tank, a receiver at the pump house and a signaling panel usually located in the power house where it is under constant supervision.

The transmitter contains pressure-sensing elements connected to the static line from the tank. These elements operate mercury switches set to cut in and out at the desired water levels in the tank. Properly adjusted, these switches will operate electrical relays and send signals to the pumps causing them to start in accordance with the water level variations in the tank. At a certain level below the overflow, the first pump will cut in and continue to pump until the plant demand is satisfied and the water level reaches the overflow in the tank. If one pump cannot handle the load and the water drops to a lower level in the tank, the pressure elements will cause the next pump to start. In addition to having pressure elements for initiating operation of pumps, the transmitter may contain other elements to register the low level in the tank and transmit an alarm to the signaling panel in the power house. In order to prevent faulty operation of controls due to possible surges, adjustable time delay relays should be employed in the transmitter. To protect the delicate relays in the transmitter cabinet from possible condensation, it is advisable to have thermostatically controlled heating elements mounted in the cabinet.

If an altitude valve is installed in the supply pipe to the tank in order to protect the tank from overflowing, the valve should be equipped with a switch to override the pressure controls and stop the pumps when the valve closes.

The transmitter as its name implies, transmits electrical signals to the receiver in the pump house. The receiver generally contains electrical relays actuated by the signals received from the transmitter and through a system of interlocks automatically operates the pump starters. In addition to operating circuits, the receiver may contain protective circuits to stop the pumps if, for example, they should take suction from a tank in which water had fallen to a low level. If two or more pumps are used in the system an automatic alternator should be included in the receiver cabinet in order to equalize the wear on the pumps. The receiver may have additional circuits to transmit alarm and information signals to the signaling panel. These may cover low water in the suction tanks, low pressure on the suction main, and operating condition of each pump.

The signaling panel contains the required number of indicating lights and an alarm bell which can be stilled by a silencing button. The alarm light remains on until the alarm condition has been corrected.

The water distribution system connects the source of water, metering installation, pumps, storage and points of water usage in the main and service buildings. Generally the water main is brought underground into the individual buildings. There it rises to the overhead space where a water pipe loop is formed with branches extending to the points of demand.

In laying out and sizing the mains within the buildings, provisions should be made for future possible expansion of the plants. All important points of demand should be connected to a looped piping system. By properly locating sectional valves, it will be possible to adequately supply these points of water use even if part of the system should be temporarily out of order.

Plastic Compound Roof Ventilator

Makes Masonry Penthouse Unnecessary

A detailed description of a power roof ventilator is given because we believe it represents a unique and significant contribution to the growing application of plastics to air handling design. One housing holds all the exhaust units.

THIRTY-SIX power sections, handling all the exhaust requirements of the new Research Laboratory for Monsanto Chemical Company's Inorganic Chemicals Division, are neatly contained beneath one long, low plastic louvered hood and cannot be seen from the ground. From a more elevated vantage point, the observer sees only a sleek, white modern-looking shell that blends into the architectural motif of the laboratory and the other buildings comprising the company's new headquarters at St. Louis, Mo.

The unique design came about because of concern by the architectural and mechanical departments of Holabird & Root & Burgee of Chicago, Architects and Engineers, that a standard continuous masonry penthouse to accommodate the standard type of volute scroll fan for fume hood exhaust would interfere with the elevation of the building from an architectural or design standpoint and be quite expensive, as well. Further, it was Monsanto's desire to incorporate as many plastic materials as sensibly possible inasmuch as the company is a leading plastic raw materials manufacturer.

Fig. 1. Workmen assembling ventilator. Steel sub-structure is made of square mechanical tubing.

Reynolds Ventilator Manufacturing Corporation of Chicago, in cooperation with the designers created a unit with a steel sub-structure (see Fig. 1) and a polyester resin reinforced fiber glass exterior surface. See Fig. 2. Because of the particular laboratory hood fume and exhaust layout, it was found sensible to extend this roof ventilator over a distance of 100 ft 10 inches, thereby bringing each fan as close to its particular fume hood as possible. Having a continuous appearance throughout its entire length, the compound roof ventilator consists of ten intermediate sections, each 8 ft long, enclosed by two 10 ft 5 inch end sections. Due to the physical nature of each fan unit, it was possible to locate four fans within each section, or a maximum of 48 fans, a number that slightly exceeded the requirements of the building.

Eventually, 27 fiber glass reinforced polyester resin fans were specified along with six aluminum fans and three standard steel fans, the last being coated with isocyanate paint. The decision as to fan material was made by the owner to offer maximum resistance to corrosion relative to each unit. Thirty-three of the 36 units were supplied with two-speed motors so that each fan could handle one hood at low speed and two at high speed, as required by the chemists. When two hoods are being used, a manual damper arrangement is changed at the same time that the fan is switched to high-speed operation for maximum exhaust. All motors were over-sized one fractional increment to accommodate the variable pitch drive on each fan. The plastic fans (see Fig. 3) exhaust 1050 cfm from each of two hoods. The aluminum fans each handle 3000 cfm. The steel fans handle exhaust from locker room, mechanical equipment room, and toilet. Inasmuch as only 36 were installed, there is room for 12 more fans for future installation.

The plastic fans are a new concept in fan design, developed by Tru-Scale, Inc., Wichita, Kansas, and applied for the first time, commercially, on this job. As shown in the demonstration model, Fig. 4, it has a conically shaped rotor with blades regularly spaced around it and perpendicular to it. A double volute inlet and discharge cone surrounds it. These glass fiber reinforced polyester resin units run at relatively high speeds compared to standard backwardly inclined fans,

Fig. 2. Compound ventilator is sheathed in plastic. Composed of twelve subdivisions, careful assembly creates monolithic effect.

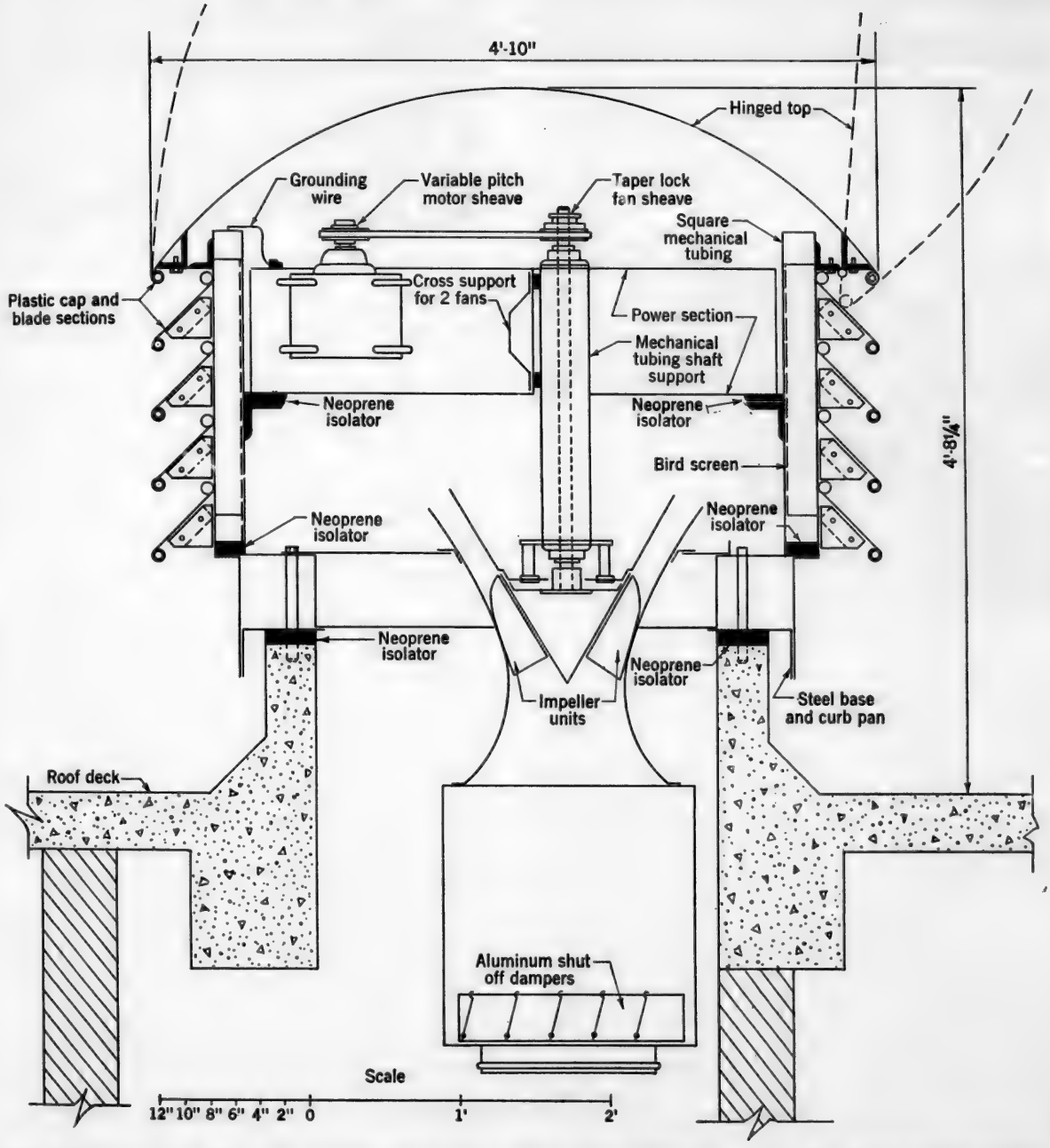


Fig. 3. Cross-sectional elevation of ventilator shows power section containing plastic fan. Note power section is isolated by Neoprene cushions on steel sub-structure, and that steel sub-structure is similarly isolated from concrete base.

Fig. 4. Twirling blades of all-plastic fan are stopped by high-speed camera. Although vanes are mounted perpendicular and parallel to axis around which they spin, no spill off or turbulence zone is created. Rotation of cone keeps air moving in direct line as demonstrated by smoke in photograph.

Fig. 5. Hood of each section opens, exposing power section for maintenance.

yet their noise levels are very low and their efficiencies very high. Incidentally, it is impossible to reverse their flow accidentally and send toxic fumes back into the lab, as flow is independent of the direction of blade rotation.

Figure 3 shows a sectional elevation of the compound ventilator plastic fan. One of the most important facets of the entire design is the steel sub-structure. Although custom designed and built, most of its parts are interchangeable with each other and the majority of its parts are typical. Component parts are sized within the sensible increments of standard sheet, bar, and tubing sizes available to manufacturers by the steel industry. The main frames of the steel structure are all tubular, resulting in great inherent strength for each sub-assembly. Tubular members supporting the exterior plastic fins and power sections are standard 2½-inch square, 11-gage, hot rolled seamless mechanical tubing. Note that the steel base and curb pan is also tubular. It is fabricated from 14-gage black iron formed to accommodate the desired shape. The 2½-inch square tubing is mitered to eliminate exposed tube ends. Continuous welding around these joints seals the inside of the tubing from the atmosphere; the

Fig. 6. Typical power section with hood removed.

same with the base and curb pan, except that it was not necessary to compound the joints inasmuch as it was easy to cap each end with a plate and continuous welding.

Between the impeller and the fan sheave, 4-inch square mechanical tubing encloses the fan shaft. Self-aligning pillow blocks are located at its extreme ends. In connection with the plastic fan assembly shown, note tubing is recessed below the uppermost part of the inside stationary cone, providing a support for the cone and the lower bearing. By bringing bearings as close as possible to the fan, bearing life will be extended.

Neoprene rubber isolators, between the concrete curb and the steel base and curb pan, between the latter and the square riser tubing, and between this last and the power section channel so completely eliminate metal-to-metal contact between the power section and the body that it was necessary to ground these assemblies together by use of ground wire shown in the diagram.

As seen in the photograph of the ventilator, there are no off-sets or irregularities between the plastic louver fins in any of twelve sections that comprise the compound ventilator. This was accomplished by provision for accurate mounting of the blades to the steel frame and by doweling together the ends of adjoining blades. To the underside of each blade is attached a plastic angle bolted through oversized holes to formed steel clips mounted on the risers of the steel sub-structure. Each of the twelve top caps are so hinged as to facilitate maintenance by the owner. See Fig. 5.

Each power section has an H shape in plain view, accommodating two fans with their associated drives. See Fig. 6. There are 24 power sections altogether, two in each subdivision of the compound ventilator, though some of them accommodate only one fan and drive. It is considered important that each section is isolated from the other to avoid the noise associated with possible sympathetic vibration when combinations of fans work together at different frequencies.

GATE, GLOBE, AND CHECK VALVES

The descriptions and information on gate, globe, and check valves which follow were prepared by B. Krueger and E. N. Morris, both of the office of Guy B. Panero, Consulting Engineers, New York.

Description

Gate valves. The working parts of gate valves include a wedge or gate which fits into the open passageway of the valve between machined seats; a threaded stem or spindle; a handwheel, and packing.

The bonnet may be of one piece construction screwed directly to the valve body, or consist of a union connection screwed to the body. The bonnet also may be bolted to the body, or be constructed as a yoke, exposing the stem or spindle.

Packing fits around the stem in a recess in the top of the bonnet and is held in place by a packing nut which screws to the bonnet, or by a packing gland which is bolted to the bonnet. A packing gland bushing, or follower, installed between the gland or nut and the packing, transmits the force exerted by the packing gland or nut to the packing.

Larger gate valves are the outside screw and yoke (OS&Y) type, with a bolted bonnet, bolted gland, and rising stem. Smaller gate valves are of the inside screw, rising stem, screwed bonnet, screwed packing nut type. Larger valves are flanged on the ends; smaller valves are screwed or solder end valves.

Globe valves. The working parts of globe valves consist of a disc which fits over a circular horizontal opening in the valve passageway into which a "seat" has been fitted or machined; a stem or spindle; a handwheel, and packing.

The same variations that apply to the construction of bonnets, packing glands or nuts and the type of end connections of gate valves also apply to globe valves.

Check valves. The working parts of check valves consist of a hinged disc or clapper which is free to swing upon a hinge pin in only one direction. There are no exterior working parts whatever on a check valve.

Operation

Gate valves. Gate valves are installed in the pipe line, and the passageway of the pipe continues straight through the valve. A wedge (gate) is moved up or down, out of or into the passageway, to permit or prevent flow through the valve. As the handwheel is turned counterclockwise, the threads on the stem or spindle engage the threads in the bonnet and the stem, and the attached wedge is raised out of the passageway. When the handwheel is turned clockwise, the stem screws down through the bonnet and the attached wedge is lowered into the valve passageway, thus preventing flow through the valve. The packing, which is held in place by the packing gland or nut, prevents the fluid within from escaping around the stem, through the bonnet.

Globe valves. Globe valves operate in the same way as gate valves, except that the disc in the globe valves is horizontal and seats against a horizontal opening. When the handwheel is turned counterclockwise, the stem threads through the bonnet, and the disc is lifted off the horizontal valve passageway. When the handwheel is turned clockwise, the stem screws down into the bonnet and the disc is lowered onto the valve passageway, thus preventing flow.

Check valves. Check valves are automatically operated by the fluid flowing through the valve. The clapper is free to swing only in the direction of the flow of the liquid in the pipe line. The pressure exerted by the liquid flowing through the valve lifts the clapper and holds it in an open position. When the flow stops in that direction, the clapper falls back to its original position by gravity, thus preventing back flow.

Recommendations

A valve must never be forced closed. Although strainers are installed in the pipe line to protect valves and other equipment, pipe scale and other foreign material may be present in the liquid in the pipe line, and may become lodged in the valve seat, preventing the valve from closing. To dislodge the

foreign material, the valve is partially opened and closed several times. If the valve does not seat properly after this "washing," the supply to the valve is closed off, the bonnet assembly removed, and the seating surfaces wiped with a clean cloth. The valve is then reassembled and the seating action tested to make sure that the trouble is only dirt.

Note. The "washing" process described is useful only where liquid in the pipe is flowing. It is of no value where the line is flooded and fluid is static or where the line has been drained.

All gate valves are to be either tightly closed or fully opened, as required. When left in a partially opened position, the wedge and seats become grooved and damaged, or "wiredrawn."

The attached piping must be properly supported or hung, so that the valve is not subjected to undue strain resulting from pipe movement.

A gate valve must never be used for throttling or regulating flow; it must be either opened fully or closed completely.

When installing flanged valves, the flanges must be properly aligned. The bolts must not be inserted haphazardly and screwed up on the flange nuts until the flanges are forced into contact. Special care must be taken not to mar gasket faces of flanges by tightening with foreign matter between faces or by accidentally striking with tools.

The piping must not be "sprung" in order to remove or replace a valve. It is better maintenance procedure to cut the pipe about 6 in. from the downstream end of the valve, remove the valve and install a union in the pipe line, before making the valve replacement.

Definitions of Terms

Body. That part of the valve which attaches to the pipe line or equipment either with screwed ends, flanged ends or solder joint ends, and encloses the working parts of the valves.

Bonnet. The top part of the valve housing, through which the stem extends. It provides support and protection to the stem and houses the stem packing. It may be screwed or bolted to the body.

Cap. The top part of the housing of a check valve (equivalent to the bonnet of a gate or globe valve) which may be either screwed or bolted onto the main body.

Check valve. An automatic, self closing valve which permits flow in only one direction. It automatically closes by gravity when liquid ceases to flow in that direction.

Clapper. A common term which is used to describe the disc of a swing type check valve.

Disc. The disc shaped device which is attached to the bottom of the stem and which is brought into contact with, or lifted off of the seating surfaces to close or open a globe valve.

Flanged bonnet. A type of bonnet so constructed that it attaches to the body by means of a flanged, bolted connection. The whole bonnet assembly, including the handwheel, stem and disc, may be quickly removed by unscrewing the nuts from the bonnet stud bolts.

Gate valve. A valve which is used to open or close off the flow of fluid through a pipe. It is so named because of the wedge (gate) which is either raised out of or lowered into a double seated sluice, to permit full flow or completely shut off flow. The passageway through a gate valve is straight through, uninterrupted, and is the full size of the pipe line into which the valve is installed.

Gland bushing. A metal bushing installed between the packing nut and the packing to transmit the force exerted by the packing nut against the packing.

Globe valve. A valve which is used for throttling or regulating the flow through a pipe. It is so named because of the globular shape of the body. The disc is raised off a horizontal seating surface to permit flow, or lowered against the horizontal seating surface to shut off flow. The disc may be lifted completely to permit full flow or may be lifted only slightly in order to throttle or regulate flow. The flow through a globe valve has to make two 90° turns.

Handwheel. The wheel-shaped turning device by which the stem is rotated, thus lifting or lowering the disc or wedge.

Hingepin. The pin upon which the disc or clapper of a check valve swings.

(Continued on next month's Data Sheet)

Construction Costs of Schools

C. W. KIMBALL
Richard D. Kimball Company, Consulting Engineers, Boston, Mass.

This is an analysis of school construction costs, with particular reference to heating and ventilating and other mechanical costs. A comparison is made of 1922 costs with those for 1956-57. Attention is directed to the need for studies to hold down costs which have increased more rapidly than student enrollment. Costs vary quite widely.

THE increased need for school buildings and the ever increasing construction cost of such buildings, present a problem which is being given a great deal of attention at present.

This same situation has apparently been given more concrete consideration abroad than in this country and on a somewhat different basis. One measure that has been studied there with good results, is the floor area required per pupil educated. The study has resulted in a present standard of approximately 73 sq ft of floor area per pupil.

School buildings, on a business basis, should produce the best results possible per pupil educated, with the lowest possible cost for construction and also for lowest maintenance during the years the building will be used as a school. This maintenance item has increased much faster than the income available for that item and also much faster than the student enrollment figure. Why?

The writer tabulated school building costs in 1922-23, presented in Table 1, and lately has assembled costs on a list of present buildings, listed in Table 2. The comparison is very interesting.

In making these comparisons there are many variables to be studied, and in some cases, they explain the variation of the units of cost.

In some cases the school building develops as a community center as well as just a school; therefore the pupil cost may seem higher than it should. In other cases, however, the actual planning of the spaces included fails to keep the non-essentials at a minimum. Also, the various State and local regulations have a decided influence as indicated by New Hampshire costs shown in Table 2.

The item of heating and ventilating has been a changing one during the last 50 years. It is always governed by the State regulations and is influenced by various methods of construction and changing ideas developed during that time.

Changes in Heating

Let us start with the hot air heating and ventilating system that used warm air. Furnaces were set in brick chambers in the basements with brick flues to the rooms for air supply and with brick vent flues extending through the roof for foul air removal. There were some return air ducts to the furnace for night and weekend heating. Each heating chamber had windows that could be opened for fresh air supply when the school was in session. In Massachusetts the regulations required delivery of 30 cubic feet of fresh air per pupil into the room; the same amount of air was vented through the roof.

The Fuller Warren furnace system was the best known and most widely used in this section at that time but the furnaces were comparatively short lived. Air to the rooms, many times, was badly overheated due to lack of automatic control.

Later, steam heat was employed with gravity indirect

TABLE I—COST DATA ON SCHOOL BUILDINGS, 1922

Location	Cubic Contents, Cu Ft	Costs in Cents per Cubic Foot				
		General	Htg and Vtg	Plumbing	Electric	Total
Mass.	1,232,406	25.3	3.4	1.9	1.4	32.
Mass.	1,026,645	26.4	3.9	1.6	1.3	33.2
Mass.	2,295,651	34.2	3.7	1.9	0.9	40.7
Mass.	1,196,200	27.7	2.3			30.1
Mass.	1,017,976	29.5	5.9			35.5
Mass.	1,400,000	25.2	3.71	1.12	1.78	31.8
Mass.	2,086,769	23.	3.6	1.6	1.2	29.4
Mass.	1,276,000	32.	5.4	1.3	0.9	39.6
N. J.	1,615,830	26.41	4.26	2.49	1.52	34.68
N. J.*	1,615,830	26.66	4.62	2.57	2.06	35.91
Mass.	547,000	25.31	2.92	1.41	1.75	31.39
N. Y.	205,000	35.85	6.02	1.00	1.10	43.97
N. Y.	1,342,000	25.59	4.12	1.39	.75	31.85
Mass.	452,000	33.	4.7	2.6	1.7	42.
Mass.	654,700	26.2	2.9	1.6	1.3	32.
Mass.	1,782,000	28.48	4.2	1.5	1.4	35.58
Mass.	1,026,645	26.4	3.9			33.2

* Including power plant and alternate.

C. W. Kimball, of Richard D. Kimball Company, consulting engineers, Boston, Mass., has been actively engaged in designing heating and ventilating systems for the past sixty years. During this time he has seen many changes in standards, methods and results obtained. He is a life member of the American Society of Heating and Air-conditioning Engineers and is a registered professional engineer.

radiation in brick chambers in the basement; outside windows were opened for fresh air; a hand operated mixing damper at each flue regulated air temperature to the rooms. Pipe coils were installed along the outside walls under the windows for the heating.

Automatic control, pneumatic type, came into use quite extensively at this time with varying success as the systems were developed and improved.

In the early days, school building plans and specifications were quite standard and simple compared to present methods. A month was a long time for both architect and engineers to complete plans and specifications for school buildings that still exist in good condition and have a minimum of maintenance costs.

As school buildings became larger, the central fan system came into use, more generally with steam primary heating coils, automatically controlled, supplied by steam boilers operating with either high or low pressure, and with engine driven fans in the larger buildings to provide ventilation.

From the fans, either a trunk air duct extended to and through reheat coils at the base of the heat risers to each room or a double duct system was installed to each flue with automatically controlled mixing dampers at each flue to insure proper air temperature to each room. Direct radiation was installed in each room for actual heating and for use when the fans were not operated.

A change from brick flues to galvanized iron followed to save space and cost. Vent flues changed to galvanized iron, extending to fans exhausting through roof or side walls.

Up to this time almost all schools were designed with pitch roofs for long life and this design resulted in low maintenance costs.

Heating Unit Developed

As the systems described seemed to (1) take up too much space, (2) the air control and temperature distribution did not always meet the changing requirements of the rooms with their varying north and south exposures, and (3) costs of labor and material continued to rise, the class room heating and ventilating unit was developed to give each room its own ventilating system with its individual control for better regulation.

The hot water heating systems later became much better developed with motor driven pumps, smaller sized piping and with better control to meet the varying weather conditions.

The system of radiant heating also developed very rapidly with heating coils in the floors using hot water as a heating medium, automatically controlled. Later the coils were put in the ceiling instead of the floor. Unfortunately, however, this heating system had to be in addition to the required ventilation. The combination did not produce results that were sufficiently better to justify the costs.

Changes in Fuel

During this time coal fuel, either hard or bituminous, was the standard with automatic stokers on the larger plants. The increasing costs of fuel and of labor then indicated a change to fuel oil as the design of burners and their controls were improved. These advancements resulted in less "puff backs" and explosions. Oil burners, also being automatic, required less labor.

Other methods have been tried for heating and ventila-

TABLE 2—SCHOOL COSTS—1956-1957

Location	No. of Pupils	Total Costs in Dollars				Mechanical Costs Per Pupil, Dollars		
		Sq Ft Per Pupil	Cost Per Sq Ft of Floor	Cost Per Pupil	Cost Per Cu Ft	Heating	Plumbing	Electric
Mass.	300	74	16.78	1241.70	1.12	166.50	101.00	76.96
Mass.	200	76	12.53	952.28	1.10			
Mass.*	1038	132	16.25	2145.00	0.81	240.00	92.82	176.90
Mass.*	600	153	15.45	2371.20	0.95	279.99	122.40	183.80
Mass.	270	78.5	17.14	1316.12	1.15	180.55	80.86	100.48
Mass.	300	103.5	23.90	2455.00	1.63	216.20	102.95	132.95
Mass.*	850	173	16.43	2823.00	1.09			
R. I.*	700	71	15.81	1122.50	0.947	197.38	75.97	112.47
N. Y.	750	140	16.12	2230.00	0.96	224.06	162.40	212.50
N. Y.	240	81	13.43	1090.00	0.938	144.96	137.70	98.82
Del.*	1400	111	16.00	1760.00	1.06	167.61	114.30	148.74
N. H.	540	99.9	11.91	1190.14	.725	164.81	72.04	87.48
Conn.	360	58.2	17.10	996.00	.95	129.00	58.61	72.22
N. H.*	120	122	9.53	1162.00	.46	228.00		44.60
Vt.	360	57	10.39	600	.58	116.50		21.70
N. H.*	120	169	9.31	1544.00	.64	291.30		52.00
Vt.	180	82	10.31	862.00	.51	170.00		26.40
N. H.	240	56	10.48	589.00	.64	108.35		25.60

* Auditorium or all-purpose room included in school.

tion. In same cases, the recent methods tried were only repeats, in slightly different form, of methods tried years ago and abandoned.

Later developments improved the equipment being used. Only time and experience will give the answer as to the value of the changes.

Rules and Regulations

During these years, the rules and regulations of the various States were considered and changes made. Some were helpful and some resulted in increased cost and confusion.

The Vermont regulations now include items that increase the cost, especially the lighting, and the regulations have ruled out the use of the so-called "open-window" system of ventilation. New York regulations now have included this system. Massachusetts and Vermont are the only States in this section that will not approve this system although it has been for many years in quite general use elsewhere and is still being used with satisfactory results.

Vermont regulations, however, include the provision that when the out-of-doors temperature goes below 20 deg F, the air supply can be reduced to one-quarter that required above 20 deg weather.

Just why less ventilation is required when, naturally, the building is shut tight, than is required during milder weather when the tendency is to open windows, the writer cannot explain.

Here in Massachusetts, the amount of out-of-door air introduced and vented has been cut one-half, but the air circulated in the rooms remains at 30 cu ft per pupil, the same as it was 50 years ago. There is still no law or penalty that enforces the use of this ventilation system after the building is in use.

The report of the Massachusetts Board of Education on schools, plus Tables 1 and 2, indicate some interesting facts such as:

1. School construction costs vary quite widely.
2. School construction costs have increased faster than student enrollment.
3. School building maintenance costs have lately increased much faster than the income for this item.
4. Apparently State and local regulations have some bearing on construction cost.

Current Questions

Tables 1 and 2 present costs that may be of interest; they show the wide variations in areas per pupil, in costs and they give some information regarding inflation. Items in these tabulations would seem to raise several questions that should be considered in planning future work, namely:

1. Is this rapidly increasing cost necessary?
2. Is the floor area per pupil given proper study?
3. Are present expenses necessary or worth while, considering present tax rates?
4. What can be done to bring the costs down more in line with the actual increase in student enrollment?
5. What can be done to bring the maintenance cost more in line with the income available?
6. If New Hampshire can produce satisfactory schools at lower costs, why not other States?
7. Apparently there are two different schools of thought regarding this problem. One group says give all the new ideas free reign and never mind the cost and the burden to the taxpayer, the slogan being "everything for the scholars and let someone pay the bill." The other group says—"The scholars should be given proper education without the taxpayer being burdened with an ever increasing tax load to pay for frills, experiments and buildings that may be monuments to the Building Committee." In our opinion the present trend of school buildings will bring excessive yearly maintenance costs and they will not last as well as the older type of building. Basically the taxpayer may be to blame because he does nothing to prevent excesses until too late.

Winter Operation of Cooling Towers without Freeze-up

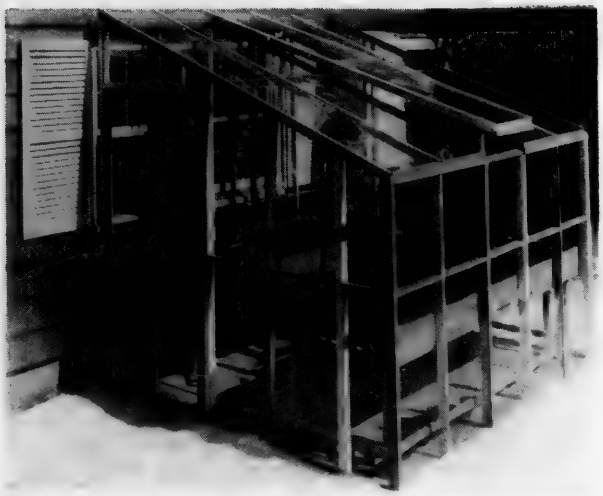
Winter operation of air conditioning cooling towers and evaporative condensers poses serious problems of freezing and ice formation. In many cases the water can be prevented from getting too cold by keeping tower sprays on but fan off, or by keeping both sprays and fan inoperative with water flow by-passed through the pan of the cooling tower, suggests Dr. Sidney Sussman, chief chemist, Water Service Laboratories, Inc., New York City.

Some installations use the cooling water temperature to control a thermostatic valve which varies the amounts of circulating water going to the sprays and to the pan.

Prevention of freezing in exposed circulating water lines when cooling tower or evaporative condenser is inoperative can best be accomplished by mechanical means. One technique described by Mr. Sussman utilizes a dump or surge tank indoors. Equipment is so arranged that the contents of the outside portions of the system drain into the surge tank whenever water falls below, say, 35 deg F. In most such installations, the cooling tower pan or evaporative condenser contains less water than in summer operation. The pan drains completely as soon as the circulating water flow is shut off.

Exposed water lines are also protected from freezing by winding about them thin copper steam tubing or electrical resistance wire, and covering with insulation. Heat in each case is then controlled by a thermostatic switch or valve located at the coldest spot in the system. Such installations modulate water temperature between 35 and 40 deg. It is usually not necessary to protect the pan, as ice formation there can do no damage.

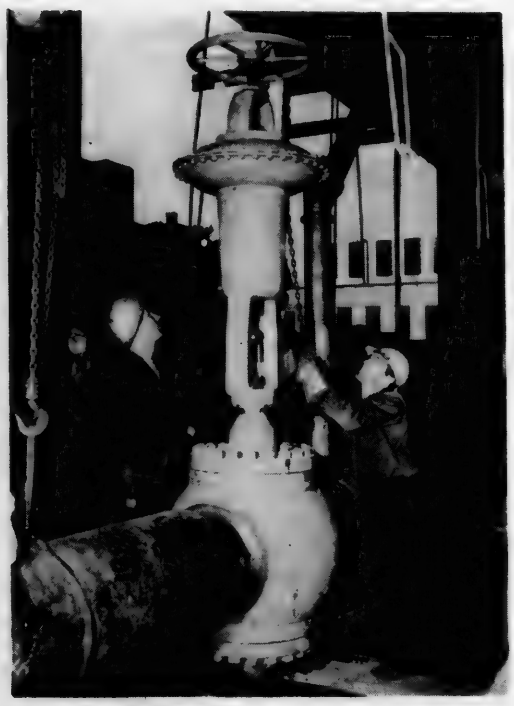
Dr. Sussman presents reasons why the use of glycol anti-freeze is not to be recommended. In the first place, under certain conditions glycol reacts with chemicals already added to the water to prevent corrosion or scale formation. The main deterrent to its use, however, is excessive cost. Calculating windage loss, ignoring bleed, and figuring glycol at $1.80 per gal, a 100-ton tower would use up $18 worth of glycol per hr of operation, though reduced use of sprays and fan may reduce this figure considerably.



PLASTIC GLAZING. A backyard greenhouse-sunhouse, made with Sisal-Glaze, an acrylonitrile-styrene copolymer, illustrates one of the uses for this semi-rigid, glass-clear plastic introduced by American Sisalkraft Corp., Attleboro, Mass. Material is said to be unaffected by temperatures from −60 to +185 deg F and to transmit 92% of infrared rays plus most of the ultraviolet, too. Commercial applications include greenhouses, glazing for construction shacks, and hospital solariums.

BACTERIA-KILLING LAMP. As described in this month's News of Equipment and Materials, an ultraviolet lamp which sets up a barrier of death to bacteria, virus, and molds has been developed by engineers of Westinghouse lamp division. Dr. Rudolph Nagy, manager of ultraviolet development, holds Petri plates which have been exposed to contaminated air passed through heating ducts. Plate at left, containing practically no bacteria, was in duct which had the high-output Sterilamp tube, shown in foreground.

Picture Paragraphs

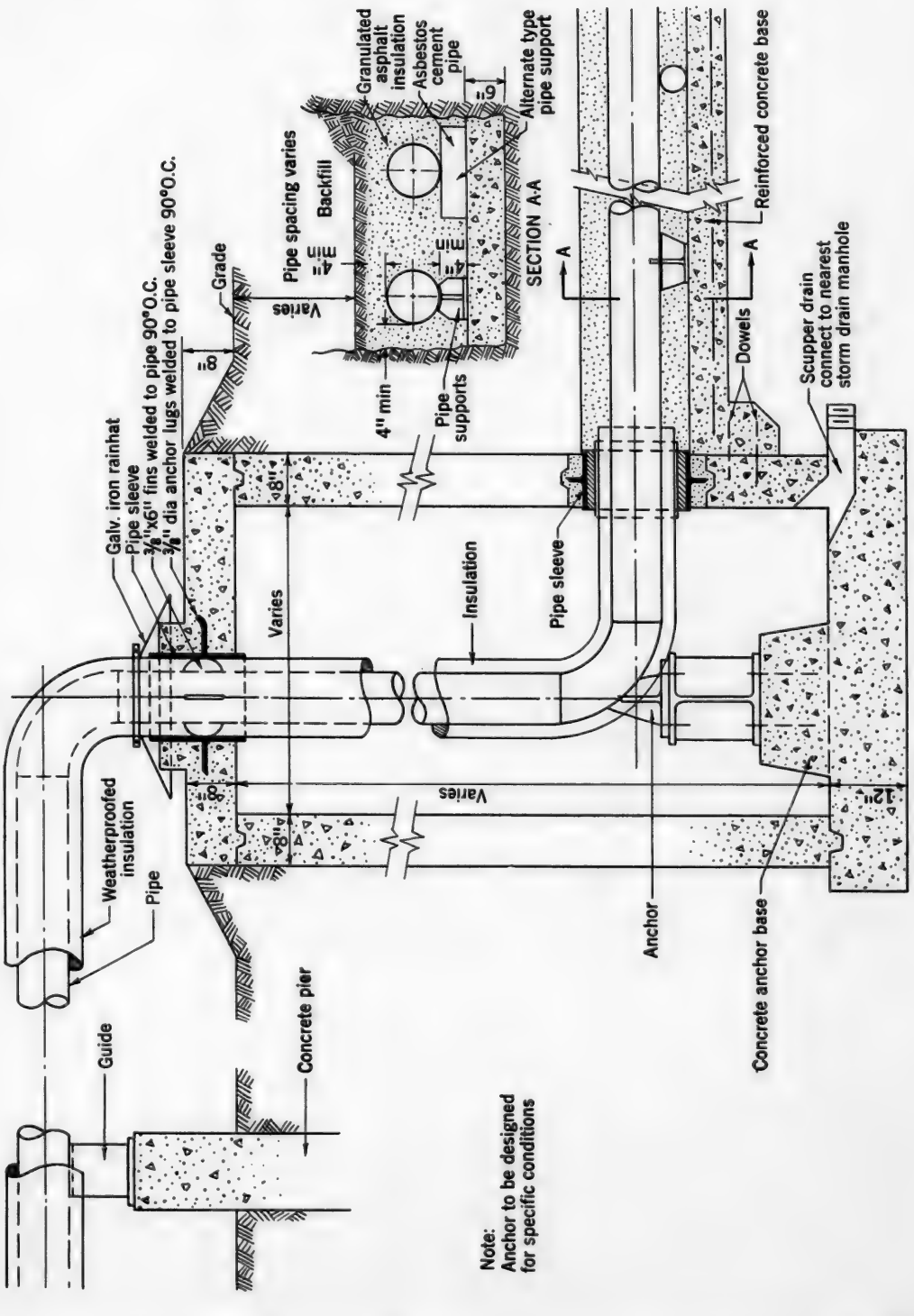


SUPERMARKET AIR CONDITIONING. Victory Chain, Inc., recently air conditioned its supermarket in Norwich, N. Y. An unusual aspect of the installation was the refinishing and placing of the low-side units. Before being recessed in the sales area wall, three 8-ton units, manufactured by Typhoon Air Conditioning Co., Brooklyn, N. Y., were taken to an auto body shop where the factory finish of the packaged units was ground down and repainted porcelain white to harmonize with the interior of the store.

GIANT CONTROL VALVE. Just how some 600 utility customers get steam next year in Philadelphia will be dependent upon two huge 2-ton steel valves, like this one being installed at Philadelphia Electric's Edison steam plant. Each of the 16-inch, 9½-ft high diaphragm control valves can handle up to 400,000 lb per hr of 450 deg F steam under pressure of 160 psi. The big valves, which have stainless steel internal parts, each took Minneapolis-Honeywell's valve division 155 hours to machine.

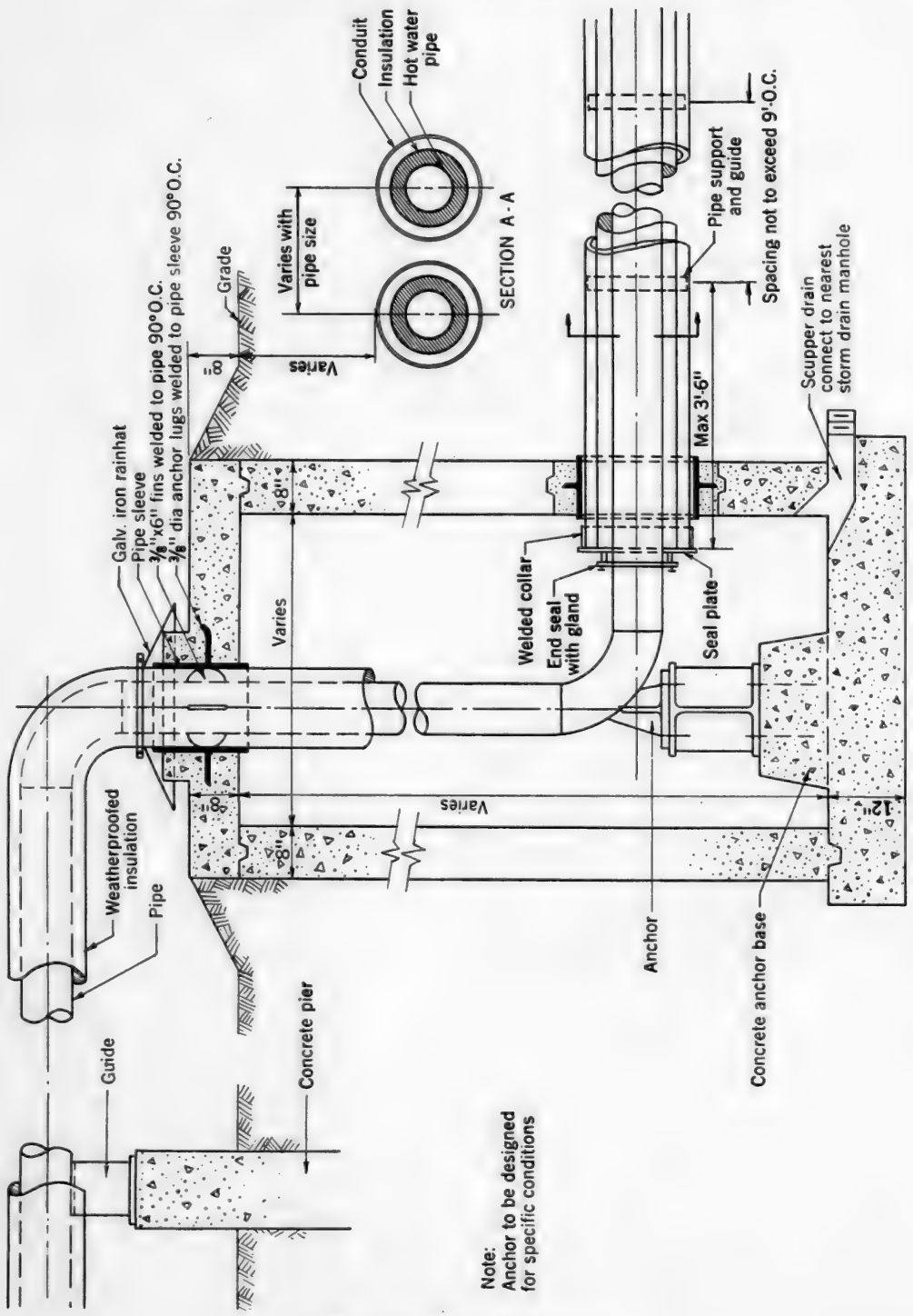
TRANSITION MANHOLE

UNDERGROUND PIPE — GRANULATED ASPHALT INSULATION



TRANSITION MANHOLE

UNDERGROUND PIPE — PREFABRICATED CONDUIT



Drawings on This and Reverse Page,
Courtesy of B. H. Krueger and E. N. Morris of Guy B. Panero, New York, N. Y.

AIR CONDITIONING, HEATING and VENTILATING'S

REFERENCE SECTION

DECEMBER, 1957

Commercial and Industrial Finned-Tube Radiation

A STAFF REPORT

Summary and specifications of finned-tube radiation components for the perimeter heating of commercial and industrial spaces

Commercial and Industrial Finned-Tube Radiation

A STAFF REPORT

Following up the November Reference Section on Residential Baseboard Radiation is this report on finned-tube radiation at commercial and industrial perimeters. Types of heating elements and available styles of covers and enclosures from a number of manufacturers are reviewed, with descriptive specifications presented in tabular form.

IN the November Reference Section, a summary of manufacturers' equipment for residential baseboard radiation was presented. Specifications and ratings were presented in tabular form, and various installations of baseboard systems were described and illustrated.

Much of the equipment, as far as heating capacity is concerned, is applicable to certain commercial and industrial uses, especially where attractiveness would be a prime consideration as in executive offices. However, many manufacturers have lines specially designed for commercial and industrial application. This equipment, in a wide variety of heating elements and enclosures, is functional and efficient, stressing high output rather than highly stylized appearance. Commercial and industrial finned-tube sizes generally start at one-inch IPS or standard copper tubing.

The scope, then, of this Reference Section is not to repeat data on baseboard radiation equipment designed for residential heating however applicable it might be to certain forms of commercial and industrial perimeter heating, but rather to delve into those lines developed primarily for commercial and industrial use. Data shall be limited to available sizes of finned-tube radiation and styles of enclosure which may be joined together in single, double, or triple-tiered arrangement in various increments of length to continuously fill any perimeter distance and/or meet any commercial and industrial heating requirement.

As in the case of baseboard radiation, commercial and industrial finned-tube radiation provides a combination of radiated and convected heat, and is adaptable to either forced circulation hot water systems or two-pipe steam systems. However, where baseboard radiation is floor-mounted and wall-supported, replacing wooden baseboard, commercial and industrial finned-tube radiation is usually wall-suspended, anywhere on the lower wall from a few inches above the floor to just under the window sill, which in the case of auditoriums and gymnasiums may be 8 to 10 ft above the floor.

Heat output may be controlled in two ways. The first regulates the flow of circulating air passing over the finned tube by means of chain or knob-operated damper. The second controls the source of heat by regulating the hot water or steam supply to heating element. This may be done manually through an access panel in enclosure, using a hand-operated radiator valve, or automatically by means of a thermostatically-operated, motorized radiator valve.

Fig. 1. Schoolroom application of Sunnywall finned-tube radiation. Crane Company, Chicago, Ill.

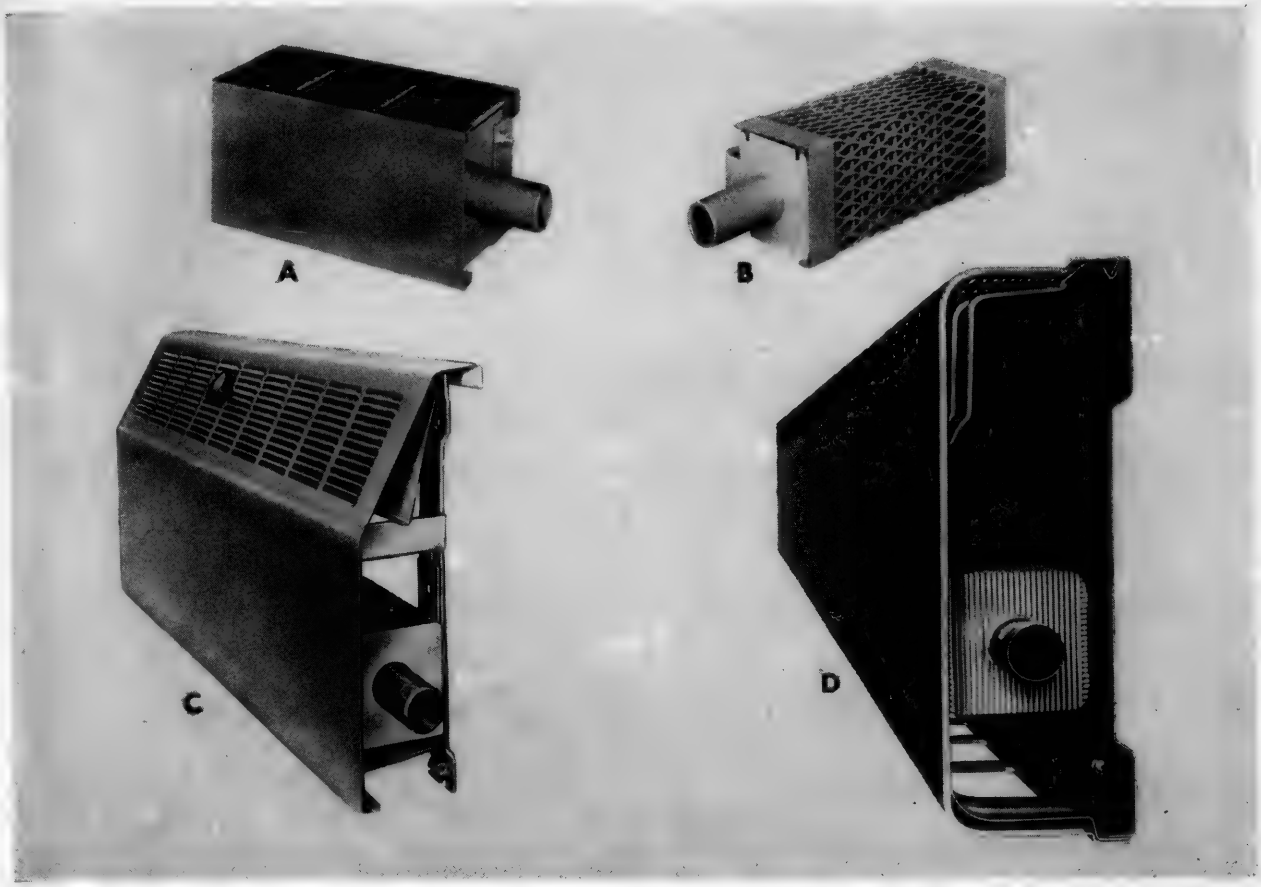


Fig. 2. Basic types of covers and enclosures for commercial and industrial applications of finned-tube radiation. (A) Closed-front, louvered-top sheet metal cover which rests on or snaps around fins of heating element. (B) Expanded metal cover with latticed front and top. (C) Sloping-top enclosure supported independently of heating element. (D) One style of flat-top enclosure. Louvers may be on front, on top, or on both front and top in this enclosure category.

The basic styles of finned-tube radiation used for perimeter heating of commercial and industrial spaces are:

1. Bare finned tube
2. Finned tube with sheet metal cover resting on fins of heating element
   a. Closed front, louvered top; 1, 2, or 3 tiers
   b. Latticed front and top; 1, 2, or 3 tiers
3. Finned tube with sheet metal enclosure supported independently of heating element
   a. Sloping top, louvered slope; 1, 2, or 3 tiers
   b. Flat top, louvered front and/or top; 1, 2, or 3 tiers

The two basic styles of both covers and enclosures are illustrated in Fig. 2. Enclosure styles have the most variation among manufacturers, especially under designation 3b. These vary from box-like units to highly stylized coverings not unlike baseboard in appearance. Some manufacturers feature a horizontal metal extension from top-rear of unit which, for under-window installation, takes the place of window sills. Sloped top enclosures have various degrees of slope, and are recommended by some manufacturers for inverted installation under the higher windows previously mentioned.

No attempt will be made to include I-B-R heat ratings in this article due to the amount of data that would be involved. For example, any heating element would have a rated output as bare finned tube; as one tier in each one-tiered, two-tiered, and three-tiered cover or enclosure; as two tiers in each two-tiered and three-tiered cover or enclosure; and as three tiers in each three-tiered cover or enclosure. In addition, heat ratings vary with the mounting height from a maximum at a specified minimum height above the floor. However, complete ratings and correction factors are available from the manufacturers.

Following is a compilation of manufacturers of finned-tube radiation for commercial and industrial application. These brief paragraphs will amplify data summarized in the table beginning on page 76. Table includes for each manufacturer a description of the line of heating elements, and the availability of basic cover and enclosure styles.

American Air Filter Co., Inc., Louisville, Ky. (Fig. 8). Commercial and industrial finned-tube radiation from this manufacturer is available with steel tube and steel fins, and copper tube with aluminum fins. Two basic cover styles and a sloping-top enclosure accommodate heating elements for multiple-tiered installations.

American-Standard Plumbing and Heating Division, New York, N. Y. (Fig. 6). Temtrim heating elements from this company are fabricated in lengths of 2 to 12 ft in 1-ft increments. In steel, with IPS-threaded ends, and copper-aluminum, with one end expanded to receive next element or standard copper tubing, heating elements have comparatively wide fin spacing for easy cleaning of fin surfaces. Two types of covers and one sloping-top enclosure are available for use with all elements in one, two, or three tiers.

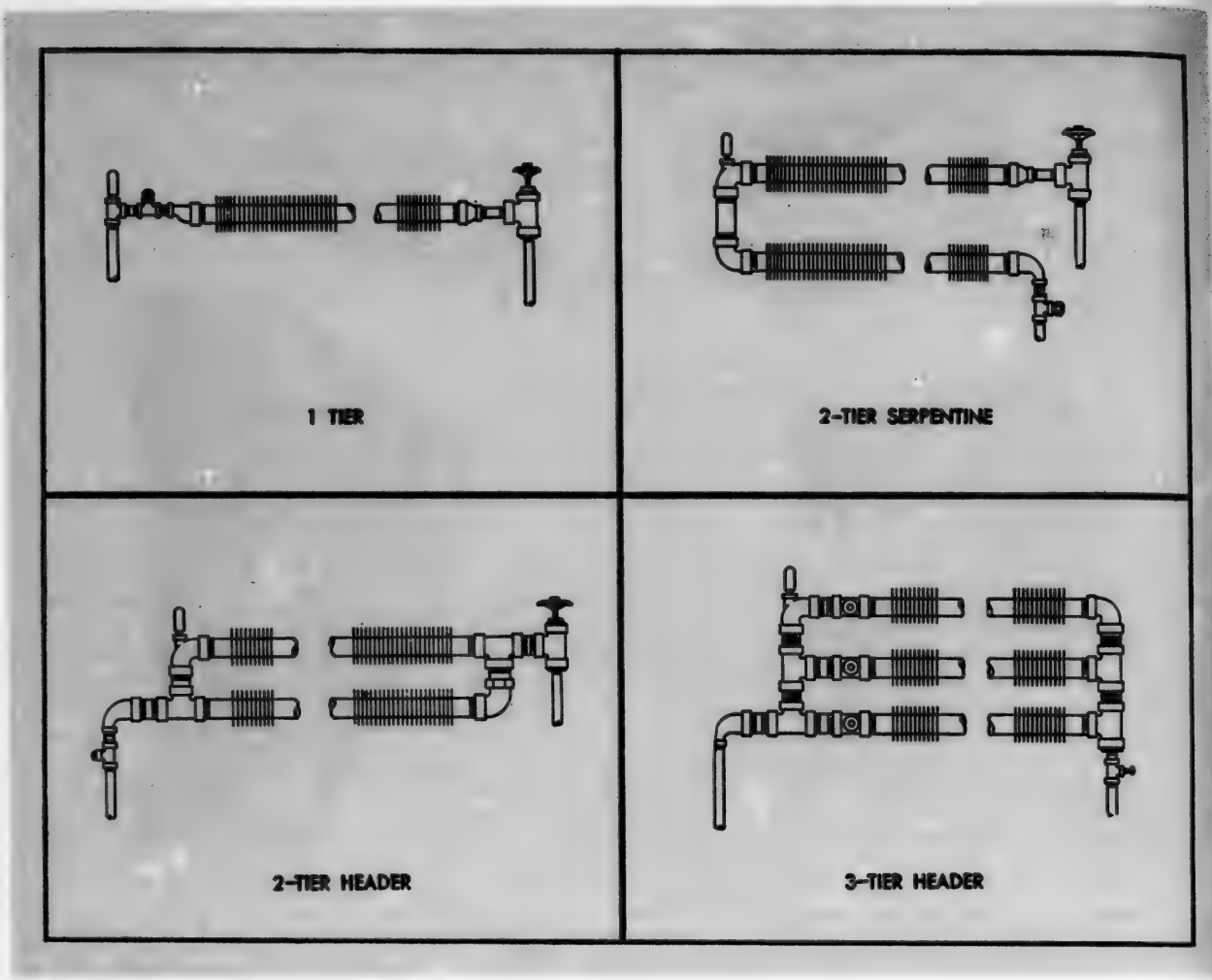


Fig. 3. Typical layouts for multiple-tiered installations in forced circulation hot water heating systems.

Baseline Manufacturing Corp., Minneapolis, Minn. (No photo). This company's Basevector radiation line offers a wide range of ferrous, non-ferrous, and combination heating elements, and variations of basic cover and enclosure styles. Sloping top enclosures are available in 60, 45, and 20-deg slope angles. Flat top enclosures come with louvers on top only, front only, and half on top, half on front.

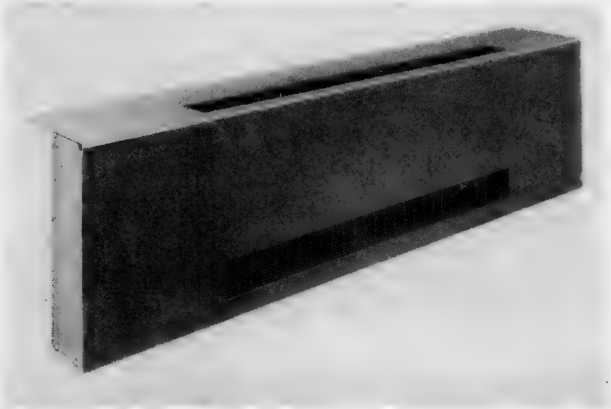


Fig. 4. Sill-N-Wall radiation featuring extension piece which takes place of window sill. The Rittling Corp., Buffalo, N. Y.

Brown Products Corp., Forest Hills, N. Y. (No photo). Bayce-heet finned tube incorporates the company's beaded-fin method of bonding fins to tube, enabling tube to be cut and threaded at any point without fracturing. Simple, movable S-hooks support second and third rows of heating element in multiple-tier assemblies. Two types of covers and two sloping-top enclosures are available for all sizes of ferrous and non-ferrous heating elements.

Crane Company, Chicago, Ill. (Fig. 1). There are two lines of Sunnywall radiation available from this company. One line, in eight styles of copper-aluminum heating elements, has one flat-top enclosure in five sizes. This stylized enclosure, for one and two-tier installations, has horizontal louvers curving from front to top. The other line, of all-steel construction, is available in the two basic cover types as well as sloping-top enclosure for multiple-tier installations.

Dunham-Bush, Inc., West Hartford, Conn. (Fig. 9). Commercial and industrial finned-tube radiation manufactured by this company has nine sizes of ferrous and non-ferrous heating elements, and a variety of cover and enclosure styles. The Fin-Vector line, available with all elements, is comprised of two types of covers and one sloping-top enclosure. Also containing all element sizes is the Thermo Vector line, a flat-topped, front-louvered, primer-coated enclosure for one, two, and three-tier as-

semblies. The company also produces a commercial type of baseboard, Model BE-12, for flush or recessed, single-tier installation. It accommodates all finned-tube sizes.

Embassy Steel Products, Inc., Brooklyn, N. Y. (Fig. 10). An all-steel line of finned-tube radiation is manufactured by this company and available in two cover types and a sloping-top enclosure for multiple-tier installations. Fins are bonded to tube by mechanical expansion; elements are made to 12 ft in 1-ft increments.

Fedders-Quigan Corp., Trenton, N. J. (Fig. 18). The manufacturer's Wall Radiation line includes steel-finned steel pipe in lengths from 2 to 12 ft in 1-inch increments, with plain or threaded ends, and aluminum-finned copper tube in lengths from 2 to 12 ft in 6-inch increments. One, two, and three-tier installations are possible in a louvered-top cover, latticed-type cover, and sloping-top enclosure.

Hoffman Specialty Manufacturing Corp., Indianapolis, Ind. (No photo). In addition to two types of covers and two models of sloping type enclosures for use with finned-tube radiation, a commercial type of baseboard, Series CB, is available from this company. Heating elements include ferrous and non-ferrous types.

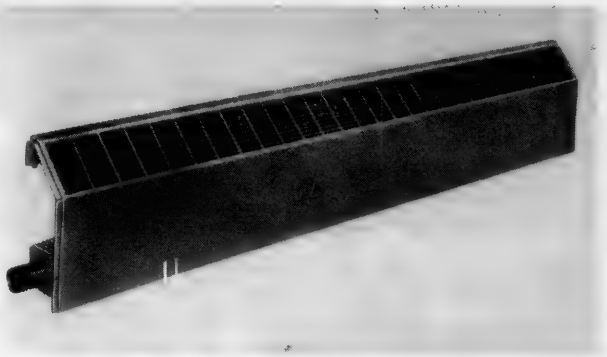


Fig. 6. Sloping-top enclosure in Temtrim radiation line. American-Standard Plumbing and Heating Div., New York, N. Y.

(Text continued on page 80)

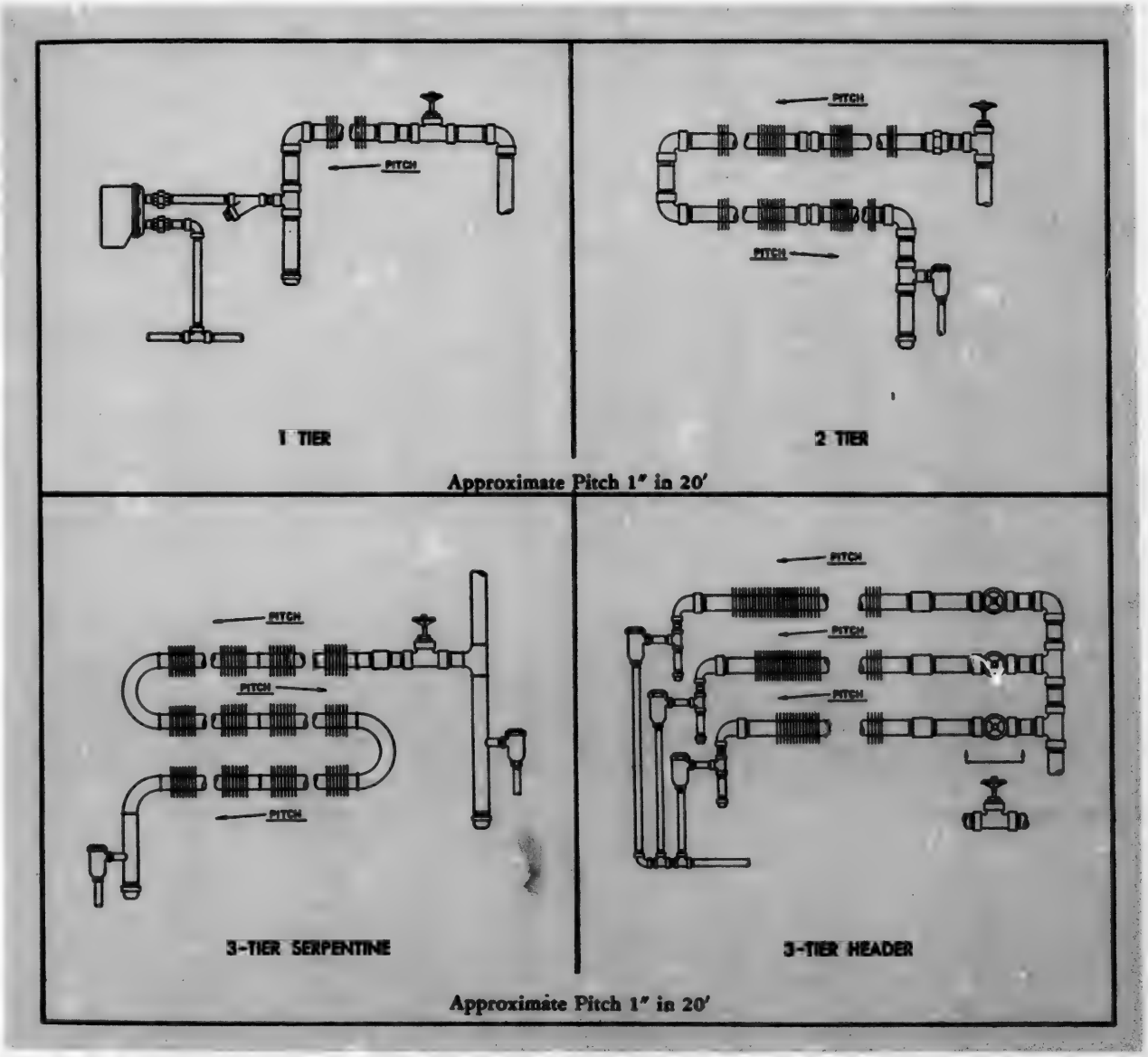


Fig. 5. Typical layouts for multiple-tiered installations in two-pipe steam systems. Diagrams, Sterling Radiator Co., Inc., Westfield, Mass.

TABLE I—COMMERCIAL AND INDUSTRIAL FINNED-TUBE RADIATION

Company	Line and Designation of Heating Element	Tube Size and Material, Inches	Fin Data: Material	Fin Data: Size, Inches	Fin Data: No. per Foot	Basic Covers and Enclosures Standard Lengths, and Height in No. of Tiers (T): Cover-Closed Front, Louvered Top	Cover-Latticed Front and Top	Enclosure-Sloped Top, Louvered Slope	Enclosure-Flat Top, Louvers Vary
American Air Filter Co., Inc.	Finned Radiation:								
	3-32-125	1¼ Steel	Steel	3¼ sq. x .024	32	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	—
	3-32-125A	1¼ Copper	Alum	3¼ sq. x .020	32	"	"	"	—
	3-40-125	1¼ Steel	Steel	3¼ sq. x .024	40	"	"	"	—
	3-40-125A	1¼ Copper	Alum	3¼ sq. x .020	40	"	"	"	—
	4-32-125	1¼ Steel	Steel	4¼ sq. x .024	32	"	"	"	—
	4-32-125A	1¼ Copper	Alum	4¼ sq. x .020	32	"	"	"	—
	4-40-125	1¼ Steel	Steel	4¼ sq. x .024	40	"	"	"	—
	4-40-125A	1¼ Copper	Alum	4¼ sq. x .020	40	"	"	"	—
	4-24-2	2 Steel	Steel	4¼ sq. x .024	24	"	"	"	—
	4-32-2	2 Steel	Steel	4¼ sq. x .024	32	"	"	"	—
	4-40-2	2 Steel	Steel	4¼ sq. x .024	40	"	"	"	—
American Standard Plumbing and Heating Division	Temtrim:								
	1¼S-3¼-24	1¼ Steel	Steel	3¼ sq. x .039	24	1' to 8', 1, 2, 3T	1' to 8', 1, 2, 3T	1' to 8', 1, 2, 3T	—
	1¼S-3¼-34	1¼ Steel	Steel	3¼ sq. x .039	34	"	"	"	—
	2S-4¼-28	2 Steel	Steel	4¼ sq. x .039	28	"	"	"	—
	2S-4¼-36	2 Steel	Steel	4¼ sq. x .039	36	"	"	"	—
	1¼S-4¼-28	1¼ Steel	Steel	4¼ sq. x .039	28	"	"	"	—
	1¼S-4¼-36	1¼ Steel	Steel	4¼ sq. x .039	36	"	"	"	—
	1¼C-3¼-34	1¼ Copper	Alum	3¼ sq. x .022	34	"	"	"	—
	1¼C-4¼-36	1¼ Copper	Alum	4¼ sq. x .022	36	"	"	"	—
Baseline Mfg. Corp.	Basevector:								
	4CA13-40	1 Copper	Alum	3¼ sq. x .032	40	4', 8', 1, 2, 3T	4', 8', 1, 2, 3T	4', 8', 1, 2, 3T	4', 8', 1, 2, 3T
	5CA13-32	1¼ Copper	Alum	3¼ sq. x .025	32	"	"	"	"
	5CS13-32	1¼ Copper	Steel	3¼ sq. x .030	32	"	"	"	"
	5SS13-32	1¼ Steel	Steel	3¼ sq. x .030	32	"	"	"	"
	5CA13-40	1¼ Copper	Alum	3¼ sq. x .025	40	"	"	"	"
	5CS13-40	1¼ Copper	Steel	3¼ sq. x .030	40	"	"	"	"
	5SS13-40	1¼ Steel	Steel	3¼ sq. x .030	40	"	"	"	"
	5CA17-32	1¼ Copper	Alum	4¼ sq. x .032	32	"	"	"	"
	5CS17-32	1¼ Copper	Steel	4¼ sq. x .030	32	"	"	"	"
	5SS17-32	1¼ Steel	Steel	4¼ sq. x .030	32	"	"	"	"
	5CA17-40	1¼ Copper	Alum	4¼ sq. x .032	40	"	"	"	"
	5CS17-40	1¼ Copper	Steel	4¼ sq. x .030	40	"	"	"	"
	5SS17-40	1¼ Steel	Steel	4¼ sq. x .030	40	"	"	"	"
	8SS17-32	2 Steel	Steel	4¼ sq. x .030	32	"	"	"	"
	8SS 17-40	2 Steel	Steel	4¼ sq. x .030	40	"	"	"	"
	8CS 17-32	2 Copper	Steel	4¼ sq. x .030	32	"	"	"	"
	8CS17-40	2 Copper	Steel	4¼ sq. x .030	40	"	"	"	"
Brown Products Company	Bayce-Heet:								
	BCF-133	1¼ Steel	Steel	3¼ sq. x .036	32	2' to 10', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 10', 1, 2, 3T	—
	BCF-134	1¼ Steel	Steel	4¼ sq. x .036	32	"	"	"	—
	BCF-144	1¼ Steel	Steel	4¼ sq. x .036	40	"	"	"	—
	BCF-143C	1¼ Copper	Alum	3¼ sq.	48	"	"	"	—
	BCF-144C	1¼ Copper	Alum	4 sq.	48	"	"	"	—
	BCF-224	2 Steel	Steel	4¼ sq. x .036	24	"	"	"	—
	BCF-234	2 Steel	Steel	4¼ sq. x .036	32	"	"	"	—
	BCF-244	2 Steel	Steel	4¼ sq. x .036	48	"	"	"	—
Crane Company	Sunnywall:								
	A	1 Copper	Alum	3¼ sq.	48	—	—	—	2' to 8', 1, 2T
	B	1¼ Copper	Alum	4¼ sq.	48	—	—	—	"
	7	¾ Copper	Alum	2¼ x 2	48	—	—	—	"
	8	¾ Copper	Alum	2¾ x 2	48	—	—	—	"
	8A	1 Copper	Alum	2¾ x 2¼	48	—	—	—	"
	8B	1¼ Copper	Alum	2¾ x 2¼	48	—	—	—	"
	10A	1 Copper	Alum	2¾ x 3¼	60	—	—	—	"
	10B	1¼ Copper	Alum	2¾ x 3¼	60	—	—	—	"
	S-133	1¼ Steel	Steel	3¼ sq. x .037	32	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	—
	S-143	1¼ Steel	Steel	4¼ sq. x .037	32	"	"	"	—
	S-144	1¼ Steel	Steel	4¼ sq. x .037	40	"	"	"	—
	S-242	2 Steel	Steel	4¼ sq. x .037	25	"	"	"	—
	S-243	2 Steel	Steel	4¼ sq. x .037	32	"	"	"	—

TABLE I (CONTINUED)—COMMERCIAL AND INDUSTRIAL FINNED-TUBE RADIATION

Company	Line and Designation of Heating Element	Tube Size and Material, Inches	Fin Data			Basic Covers and Enclosures Standard Lengths, and Height in No. of Tiers (T)			
			Material	Size, Inches	No. per Foot	Cover-Closed Front, Louvered Top	Cover-Latticed Front and Top	Enclosure-Sloped Top, Louvered Slope	Enclosure-Flat Top, Louvers Vary
Dunham-Bush, Inc.	Finned Tube:								
	1¼OTSS-3-42	1¼ Steel	Steel	3¼ sq. x .021	42	2' to 8', 1, 2, 3T Fin-Vector	2' to 8', 1, 2, 3T Fin-Vector	2' to 8', 1, 2, 3T Fin-Vector	2' to 8', 1, 2, 3T Thermo Vector
	1¼OTSS-4-42	1¼ Steel	Steel	4¼ sq. x .021	42	"	"	"	"
	1¼OTSS-4-52	1¼ Steel	Steel	4¼ sq. x .021	52	"	"	"	"
	1¼OTCA-3-42	1¼ Copper	Alum	3¼ sq. x .024	42	"	"	"	"
	1¼OTCA-3-52	1¼ Copper	Alum	3¼ sq. x .024	52	"	"	"	"
	1¼OTCA-4-42	1¼ Copper	Alum	4¼ sq. x .024	42	"	"	"	"
	1¼OTCA-4-52	1¼ Copper	Alum	4¼ sq. x .024	52	"	"	"	"
	2OTSS-4-32	2 Steel	Steel	4¼ sq. x .021	32	"	"	"	"
	2OTSS-4-42	2 Steel	Steel	4¼ sq. x .021	42	"	"	"	"
Embassy Steel Products, Inc.	Fin Tube:								
	1¼-3¼-32	1¼ Steel	Steel	3¼ sq. x .036	32	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	—
	1¼-4¼-28	1¼ Steel	Steel	4¼ sq. x .036	28	"	"	"	—
	1¼-4¼-40	1¼ Steel	Steel	4¼ sq. x .036	40	"	"	"	—
	2-4¼-28	2 Steel	Steel	4¼ sq. x .036	28	"	"	"	—
	2-4¼-40	2 Steel	Steel	4¼ sq. x .036	40	"	"	"	—
Fedders-Quigan Corp.	Wall Radiation:								
	2-4¼S-24	2 Steel	Steel	4¼ sq. x .035	24	2' to 7', 1, 2, 3T	2' to 7', 1, 2, 3T	2' to 7', 1, 2, 3T	—
	2-4¼S-34	2 Steel	Steel	4¼ sq. x .035	34	"	"	"	—
	2-4¼S-42	2 Steel	Steel	4¼ sq. x .035	42	"	"	"	—
	1¼-4¼S-34	1¼ Steel	Steel	4¼ sq. x .035	34	"	"	"	—
	1¼-4¼S-42	1¼ Steel	Steel	4¼ sq. x .035	42	"	"	"	—
	1¼-3½S-34	1¼ Steel	Steel	3½ sq. x .026	34	"	"	"	—
	1¼-4¼A-34	1¼ Copper	Alum	4¼ sq.	34	"	"	"	—
	1¼-4¼A-42	1¼ Copper	Alum	4¼ sq.	42	"	"	"	—
Hoffman Specialty Mfg. Corp.	Commercial:								
	3S-1¼-32	1¼ Steel	Steel	3¼ sq.	32	1' to 8', 1, 2, 3T	1' to 8', 1, 2, 3T	1' to 8', 1, 2, 3T	—
	4S-1¼-32	1¼ Steel	Steel	4¼ sq.	32	"	"	"	—
	4S-2-24	2 Steel	Steel	4¼ sq.	24	"	"	"	—
	4S-2-32	2 Steel	Steel	4¼ sq.	32	"	"	"	—
	4S-2-48	2 Steel	Steel	4¼ sq.	48	"	"	"	—
	3A-1-48	1 Copper	Alum	3¼ sq.	48	"	"	"	—
	4A-1¼-48	1¼ Copper	Alum	4 sq.	48	"	"	"	—
Kritzer Radiant Coils, Inc.	Kritzer Coils:								
	31-32	1 Steel	Steel	3¼ sq. x .024	32	2' to 10', 1, 2, 3T	2' to 10', 1, 2, 3T	2' to 10', 1, 2, 3T	2' to 10', 1, 2T
	31-40	1 Steel	Steel	3¼ sq. x .024	40	"	"	"	"
	31-32A	1 Copper	Alum	3¼ sq. x .020	32	"	"	"	"
	31-40A	1 Copper	Alum	3¼ sq. x .020	40	"	"	"	"
	31-32C	1 Copper	Copper	3¼ sq. x .020	32	"	"	"	"
	31-40C	1 Copper	Copper	3¼ sq. x .020	40	"	"	"	"
	3125-32	1¼ Steel	Steel	3¼ sq. x .024	32	"	"	"	"
	3125-40	1¼ Steel	Steel	3¼ sq. x .024	40	"	"	"	"
	3125-32A	1¼ Copper	Alum	3¼ sq. x .020	32	"	"	"	"
	3125-40A	1¼ Copper	Alum	3¼ sq. x .020	40	"	"	"	"
	3125-32C	1¼ Copper	Copper	3¼ sq. x .020	32	"	"	"	"
	3125-40C	1¼ Copper	Copper	3¼ sq. x .020	40	"	"	"	"
	4125-32	1¼ Steel	Steel	4¼ sq. x .024	32	"	"	"	"
	4125-40	1¼ Steel	Steel	4¼ sq. x .024	40	"	"	"	"
	4125-32A	1¼ Copper	Alum	4¼ sq. x .020	32	"	"	"	"
	4125-40A	1¼ Copper	Alum	4¼ sq. x .020	40	"	"	"	"
	4125-32C	1¼ Copper	Copper	4¼ sq. x .020	32	"	"	"	"
	4125-40C	1¼ Copper	Copper	4¼ sq. x .020	40	"	"	"	"
	42-24	2 Steel	Steel	4¼ sq. x .024	24	"	"	"	"
	42-32	2 Steel	Steel	4¼ sq. x .024	32	"	"	"	"
	42-40	2 Steel	Steel	4¼ sq. x .024	40	"	"	"	"
	21-32	1 Steel	Steel	2⅝ x 3¾ x .024	32	—	—	"	—
	21-40	1 Steel	Steel	2⅝ x 3¾ x .024	40	—	—	"	—
	21-32A	1 Copper	Alum	2⅝ x 3¾ x .020	32	—	—	"	—
	21-40A	1 Copper	Alum	2⅝ x 3¾ x .020	40	—	—	"	—
	21-32C	1 Copper	Copper	2⅝ x 3¾ x .020	32	—	—	"	—
	21-40C	1 Copper	Copper	2⅝ x 3¾ x .020	40	—	—	"	—

(Table continued on next page)

TABLE 1 (CONTINUED)—COMMERCIAL AND INDUSTRIAL FINNED-TUBE RADIATION

Company	Line and Designation of Heating Element	Tube Size and Material, Inches	Fin Data			Basic Covers and Enclosures Standard Lengths, and Height in No. of Tiers (T)			
			Material	Size, Inches	No. per Foot	Cover-Closed Front, Louvered Top	Cover-Latticed Front and Top	Enclosure-Sloped Top, Louvered Slope	Enclosure-Flat Top, Louvers Vary
National-U. S. Radiator Corp.	Fintube:								
	CA-1¼-3¼-32	1¼ Copper	Alum	3¼ sq. x .028	32	1' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	1½' to 8', 1, 2, 3T	1½' to 8', 1, 2, 3T
	CA-1¼-3¼-40	1¼ Copper	Alum	3¼ sq. x .028	40	"	"	"	"
	CA-1¼-4¼-32	1¼ Copper	Alum	4¼ sq. x .028	32	"	"	"	"
	CA-1¼-4¼-40	1¼ Copper	Alum	4¼ sq. x .028	40	"	"	"	"
	S-1¼-3¼-24	1¼ Steel	Steel	3¼ sq. x .035	24	"	"	"	"
	S-1¼-3¼-32	1¼ Steel	Steel	3¼ sq. x .035	32	"	"	"	"
	S-1¼-3¼-38	1¼ Steel	Steel	3¼ sq. x .035	38	"	"	"	"
	S-1¼-4¼-32	1¼ Steel	Steel	4¼ sq. x .040	32	"	"	"	"
	S-1¼-4¼-38	1¼ Steel	Steel	4¼ sq. x .040	38	"	"	"	"
	S-2-4¼-24	2 Steel	Steel	4¼ sq. x .040	24	"	"	"	"
	S-2-4¼-32	2 Steel	Steel	4¼ sq. x .040	32	"	"	"	"
	S-2-4¼-38	2 Steel	Steel	4¼ sq. x .040	38	"	"	"	"
Nesbitt, John J., Inc.	Sill-line:								
	A	1 Copper	Alum	3¼ sq.	48	—	—	—	2' to 8', 1, 2T
	B	1¼ Copper	Alum	4¼ sq.	48	—	—	—	—
	7	¾ Copper	Alum	2¼ x 2	48	—	—	—	—
	8	¾ Copper	Alum	2¾ x 2	48	—	—	—	—
	8A	1 Copper	Alum	2¾ x 2¼	48	—	—	—	—
	8B	1¼ Copper	Alum	2¾ x 2¼	48	—	—	—	—
	10A	1 Copper	Alum	2¾ x 3¼	60	—	—	—	—
	10B	1¼ Copper	Alum	2¾ x 3¼	60	—	—	—	—
The Rittling Corporation	Finned Radiation:								
	1-S2¾×4-32	1 Steel	Steel	2¾ x 4 x .030	32	2' to 8', 1, 2, 3T	—	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T
	1-S2¾×4-42.7	1 Steel	Steel	2¾ x 4 x .030	42.7	"	—	"	"
	1¼-S3¼-32	1¼ Steel	Steel	3¼ sq. x .030	32	"	—	"	"
	1¼-S3¼-42.7	1¼ Steel	Steel	3¼ sq. x .030	42.7	"	—	"	"
	1¼-S4¼-32	1¼ Steel	Steel	4¼ sq. x .030	32	"	—	"	"
	1¼-S4¼-42.7	1¼ Steel	Steel	4¼ sq. x .030	42.7	"	—	"	"
	2-S4¼-24	2 Steel	Steel	4¼ sq. x .030	24	"	—	"	"
	2-S4¼-32	2 Steel	Steel	4¼ sq. x .030	32	"	—	"	"
	2-S4¼-42.7	2 Steel	Steel	4¼ sq. x .030	42.7	"	—	"	"
	1-C2¾×4-32	1 Copper	Alum	2¾ x 4 x .025	32	"	—	"	"
	1-C2¾×4-42.7	1 Copper	Alum	2¾ x 4 x .025	42.7	"	—	"	"
	1¼-C3¼-32	1¼ Copper	Alum	3¼ sq. x .025	32	"	—	"	"
	1¼-C3¼-42.7	1¼ Copper	Alum	3¼ sq. x .025	42.7	"	—	"	"
	1¼-C4¼-32	1¼ Copper	Alum	4¼ sq. x .025	32	"	—	"	"
	1¼-C4¼-42.7	1¼ Copper	Alum	4¼ sq. x .025	42.7	"	—	"	"
Sarco Company, Inc.	Sarco Fin:								
	S-133	1¼ Steel	Steel	3¼ sq. x .037	32	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	—
	S-143	1¼ Steel	Steel	4¼ sq. x .037	32	"	"	"	—
	S-144	1¼ Steel	Steel	4¼ sq. x .037	40	"	"	"	—
	S-242	2 Steel	Steel	4¼ sq. x .037	25	"	"	"	—
	S-243	2 Steel	Steel	4¼ sq. x .037	32	"	"	"	—
	C-133	1¼ Copper	Alum	3¼ sq. x .020	32	"	"	"	—
	C-134	1¼ Copper	Alum	3¼ sq. x .020	40	"	"	"	—
	C-143	1¼ Copper	Alum	4¼ sq. x .020	32	"	"	"	—
	C-144	1¼ Copper	Alum	4¼ sq. x .020	40	"	"	"	—
Shaw-Perkins Mfg. Co.	Panel Radiator	1 Copper	Steel	3 x 11	18	—	—	—	1' to 9', Models A, B
	"	1 Copper	Steel	3 x 14	18	—	—	—	"
	"	1 Copper	Steel	3 x 17	18	—	—	—	"
	"	1 Copper	Steel	3 x 20	18	—	—	—	"
	"	1 Copper	Steel	3 x 23	18	—	—	—	"
	"	1 Copper	Steel	3 x 26	18	—	—	—	"
	AlRadiator	1 Copper	Steel	5 x 14½	14	—	—	—	1' to 10'
	"	1 Copper	Steel	5 x 23½	14	—	—	—	"
	"	1 Copper	Steel	5 x 32½	14	—	—	—	"
Slant-Fin Radiator Corp.	Square-Fin:								
	SQ-1	1¼ Steel	Steel	4¼ sq.	32	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	2' to 8', 1, 2, 3T	—
	SQ-2	1¼ Steel	Steel	4¼ sq.	40	"	"	"	—
	SQ-3	1¼ Steel	Steel	4¼ sq.	48	"	"	"	—
	SQ-4	2 Steel	Steel	4¼ sq.	24	"	"	"	—
	SQ-5	2 Steel	Steel	4¼ sq.	32	"	"	"	—
	SQ-6	1¼ Copper	Alum	4¼ sq.	32	"	"	"	—
	SQ-7	1¼ Copper	Alum	4¼ sq.	40	"	"	"	—

TABLE 1 (CONTINUED)—COMMERCIAL AND INDUSTRIAL FINNED-TUBE RADIATION

Company	Line and Designation of Heating Element	Tube Size and Material, Inches	Fin Data			Basic Covers and Enclosures Standard Lengths, and Height in No. of Tiers (T)			
			Material	Size, Inches	No. Per Foot	Cover-Closed Front Louvered Top	Cover-Latticed Front and Top	Enclosure-Sloped Top, Louvered Slope	Enclosure-Flat Top, Louvers Vary
Slant-Fin Radiator Corp. (continued)	Slant-Fin:								
	SL-1	1¼ Steel	Steel	3½ sq. at 45 deg	—	2' to 8' 1, 2, 3T	2' to 8' 1, 2, 3T	2' to 8' 1, 2, 3T	—
	SL-2	1¼ Steel	Steel	4½ sq. at 45 deg	—	"	"	"	—
	SL-3	2 Steel	Steel	4½ sq. at 45 deg	—	"	"	"	—
	SL-4	1¼ Copper	Alum	4½ sq. at 45 deg	—	"	"	"	—
Spi-Rol-Fin Corp.	Industrial:								
	1-S3½	1 Steel	Steel	3½ dia.	36	—	—	1' to 8' 1, 2, 3T	1' to 8' 1, 2, 3T
	1¼-S3¾	1¼ Steel	Steel	3¾ dia.	36	—	—	"	"
	1¼-S4½	1¼ Steel	Steel	4½ dia.	30	—	—	"	"
	2-S4¾	2 Steel	Steel	4¾ dia.	30	—	—	"	"
	1-C3⅝	1 Copper	Alum	3⅝ dia.	36	—	—	"	"
	1¼-C3¾	1¼ Copper	Alum	3¾ dia.	36	—	—	"	"
	1¼-C4½	1¼ Copper	Alum	4½ dia.	36	—	—	"	"
	2-A5	2 Alum	Alum	5 dia.	30	—	—	"	"
Stedco Products	Hi-Therm:								
	24-24	2 Steel	Steel	4¼ sq. x .036	24	—	—	1' to 8' 1, 2, 3T	—
	24-32	2 Steel	Steel	4¼ sq. x .036	32	—	—	"	—
	24-40	2 Steel	Steel	4¼ sq. x .036	40	—	—	"	—
	13-32	1¼ Steel	Steel	3¼ sq. x .036	32	—	—	"	—
	13-40	1¼ Steel	Steel	3¼ sq. x .036	40	—	—	"	—
	14-32	1¼ Steel	Steel	4¼ sq. x .036	32	—	—	"	—
	14-40	1¼ Steel	Steel	4¼ sq. x .036	40	—	—	"	—
	713-32	1¼ Copper	Alum	3¼ sq. x .028	32	—	—	"	—
	813-32	1¼ Copper	Copper	3¼ sq. x .020	32	—	—	"	—
	713-40	1¼ Copper	Alum	3¼ sq. x .028	40	—	—	"	—
	813-40	1¼ Copper	Copper	3¼ sq. x .020	40	—	—	"	—
	714-32	1¼ Copper	Alum	4¼ sq. x .028	32	—	—	"	—
	814-32	1¼ Copper	Copper	4¼ sq. x .020	32	—	—	"	—
	714-40	1¼ Copper	Alum	4¼ sq. x .028	40	—	—	"	—
	814-40	1¼ Copper	Copper	4¼ sq. x .020	40	—	—	"	—
Sterling Radiator Co., Inc.	Finmaster:								
	S-133	1¼ Steel	Steel	3¼ sq. x .037	32	2' to 8' 1, 2, 3T	2' to 8' 1, 2, 3T	2' to 8' 1, 2, 3T	—
	S-143	1¼ Steel	Steel	4¼ sq. x .037	32	"	"	"	—
	S-144	1¼ Steel	Steel	4¼ sq. x .037	40	"	"	"	—
	S-242	2 Steel	Steel	4¼ sq. x .037	25	"	"	"	—
	S-243	2 Steel	Steel	4¼ sq. x .037	32	"	"	"	—
	C-133	1¼ Copper	Alum	3¼ sq. x .020	32	"	"	"	—
	C-134	1¼ Copper	Alum	3¼ sq. x .020	40	"	"	"	—
	C-143	1¼ Copper	Alum	4¼ sq. x .020	32	"	"	"	—
	C-144	1¼ Copper	Alum	4¼ sq. x .020	40	"	"	"	—
The Trane Company	Wall-Fin:								
	No. 1	1¼ Steel	Steel	4¼ sq. x .032	38	2' to 10' 1, 2, 3T	2' to 10' 1, 2, 3T	1' to 6' 1, 2, 3T	1' to 6' 1, 2, 3T
	No. 2	2 Steel	Steel	4¼ sq. x .032	38	"	"	"	"
	No. 3	1¼ Copper	Alum	4¼ sq. x .025	40	"	"	"	"
	No. 4	1 Copper	Alum	3¼ x 3 x .025	38	—	—	"	"
The Vulcan Radiator Co.	Linovector:								
	1¼S-3¼-32	1¼ Steel	Steel	3¼ sq. x .032	32	1' to 8' 1, 2, 3T	1' to 8' 1, 2, 3T	1' to 8' 1, 2, 3T	1' to 8' 1, 2T
	1¼S-4¼-32	1¼ Steel	Steel	4¼ sq. x .040	32	"	"	"	"
	1¼S-4¼-40	1¼ Steel	Steel	4¼ sq. x .040	40	"	"	"	"
	2S-4¼-24	2 Steel	Steel	4¼ sq. x .040	24	"	"	"	"
	2S-4¼-32	2 Steel	Steel	4¼ sq. x .040	32	"	"	"	"
	1¼C-3¼-32	1¼ Copper	Alum	3¼ sq. x .028	32	"	"	"	"
	1¼C-3¼-40	1¼ Copper	Alum	3¼ sq. x .028	40	"	"	"	"
	1¼C-4¼-32	1¼ Copper	Alum	4¼ sq. x .028	32	"	"	"	"
	1¼C-4¼-40	1¼ Copper	Alum	4¼ sq. x .028	40	"	"	"	"
	1¼C-3¼-48	1¼ Copper	Alum	3¼ sq. x .028	48	"	"	"	"
	1¼C-4¼-48	1¼ Copper	Alum	4¼ sq. x .028	48	"	"	"	"
Warren Webster & Company	Walvector:								
	3H	1 Copper	Alum	3 sq. x .020	50	2' to 8' 1T	—	2' to 7' 1, 2T	2' to 7' 1, 2T
	4H	1¼ Copper	Alum	4 sq. x .020	50	"	—	"	"

Note: Alum refers to aluminum.

Fig. 7. Large-office application of finned-tube radiation utilizing flat-top enclosure. Kritzer Radiant Coils, Inc., Chicago, Ill.

Kritzer Radiant Coils, Inc., Chicago, Ill. (Fig. 7). Available from the company is an extensive line of finned-tube heating elements including steel-steel, copper-aluminum, and copper-copper types. Two styles of sloping-top enclosures plus all the other basic cover and enclosure types will accommodate multiple-tier installation of most heating elements. Flat-top enclosure has louvers on front.

National-U.S. Radiator Corp., Johnstown, Pa. (No photo). Louvered-top and latticed covers, and sloping-top enclosures are available for this company's ferrous and non-ferrous finned-tube radiation. Multiple-tier assemblies are fabricated with malleable iron threaded fittings; welded, long-radius return bends; or welded, mitered turns.

John J. Nesbitt, Inc., Philadelphia, Pa. (No photo). Sill-Line radiation from this manufacturer consists of 8 sizes of heating elements featuring corrugated aluminum fins mechanically bonded to seamless copper tubing. One type of enclosure in five styles is available and, designed for appearance, it has flat top with discharge louvers curving from front to top.

The Rittling Corp., Buffalo, N. Y. (Fig. 4). Finned-tube radiation available from the company includes ferrous and non-ferrous types. In addition to a louvered-top cover and a sloping-top enclosure, two styles of flat-top enclosures accommodate multiplie tiers in all sizes of heating elements. One, Sil-Vector, has rounded corners with outlet louvers curving from front to top. The other, Sill-N-Wall, has a louvered, top-rear extension which takes the place of conventional window sills in under-window installations.

Sarco Company, Inc., New York, N.Y. (No photo). SarcoFin radiation consists of the two types of basic covers and one sloping-top enclosure for multiple-tiered installation of ferrous and non-ferrous lines of heating elements. In addition, the sloping-top enclosure is recommended for inverted mounting where the installation is to be made above eye level.

Shaw-Perkins Manufacturing Co., Pittsburgh, Pa. (Fig. 13). Two types of incremental finned-tube radiation are manufactured by this company. The Panel

Fig. 8. Sloping-top enclosure in Herman Nelson finned radiation line. American Air Filter Co., Inc., Louisville, Ky.

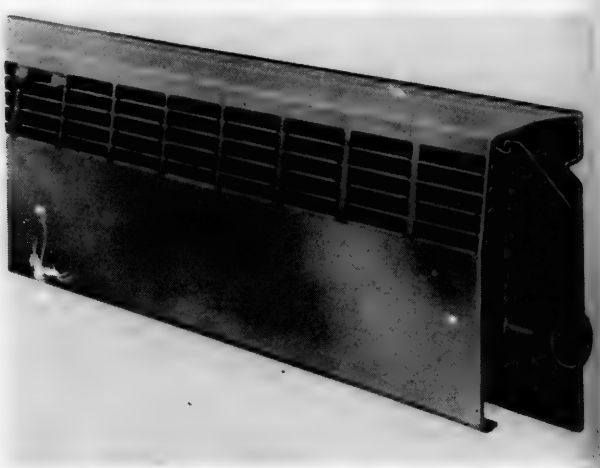


Fig. 9. Model BE-12 commercial-type baseboard. Dunham-Bush, Inc., West Hartford, Conn.

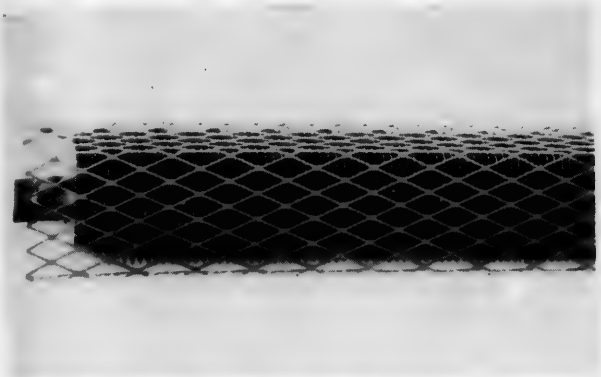


Fig. 10. Expanded metal cover for finned-tube radiation. Embassy Steel Products, Inc., Brooklyn, N. Y.

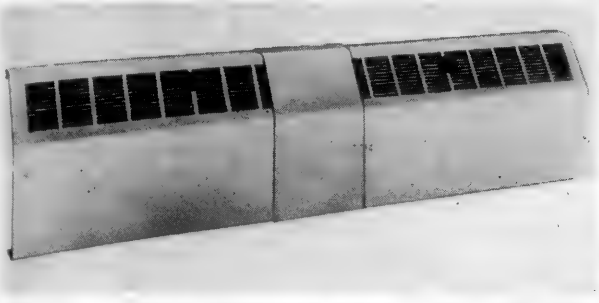


Fig. 11. Lengths of sloping-top enclosure joined by telescoping extension sleeve. Slant-Fin Radiator Corp., Richmond Hill, N. Y.

Radiator, in front and top discharge models, is available to 111 inches in 2-inch sections. Copper tubing makes two to six passes through steel plates in seven heights from 11 to 26 inches. Company's AIRadiator, available to 125 inches in 2½-inch sections, has wider plates in three heights from 14½ to 32½ inches.

Slant-Fin Radiator Corp., Richmond Hill, N. Y. (Fig. 11). Finned-tube radiation from this manufacturer is available in ferrous and non-ferrous types in both Square-Fin and Slant-Fin series. Slanted fins are oblong plates bent at 45 deg, forming projected squares, to give extra heating surface in same space. Basic covers and sloping-top enclosures are available for multiple-tier installations.

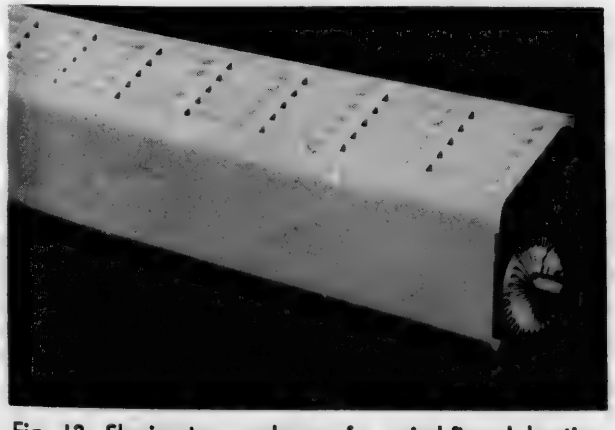


Fig. 12. Sloping-top enclosure for spiral-finned heating element. Spi-Rol-Fin Corp., Pequannock, N. J.

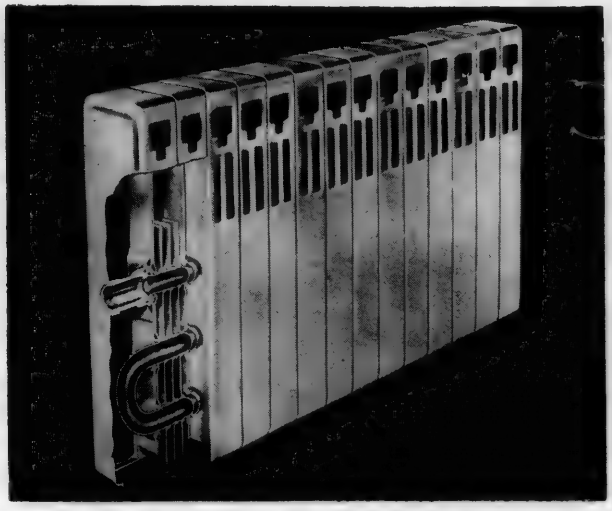


Fig. 13. Front discharge model in Panel Radiator line. Shaw-Perkins Manufacturing Co., Pittsburgh, Pa.

Spi-Rol-Fin Corporation, Pequannock, N. J. (Fig. 12). Finned-tube commercial and industrial radiation is made in all steel, all aluminum, and copper-aluminum styles. It is fabricated from standard pipe or tubing around which the fin material is spirally stress-wound, crimped at the base where fin engages pipe, and ironed flat at outer circumference. Roller-type support allows unlimited expansion.

Stedco Products, Wilkes-Barre, Pa. (No photo). This company's Hi-Therm radiation is made in all-steel construction, from 2 to 12 ft in increments of 6 inches, and copper tube with copper or aluminum fins in lengths from 2 to 8 ft in increments of 12 inches. Available in one, two, or three-tier heights are Thermo-Lux sloping-top enclosures.

Sterling Radiator Co., Inc., Westfield, Mass. (Fig. 17). All-steel and copper-aluminum heating elements in two cover styles and a sloping-top enclosure compose this manufacturer's line of commercial and industrial finned-tube radiation. Specifically recommended for above eye-

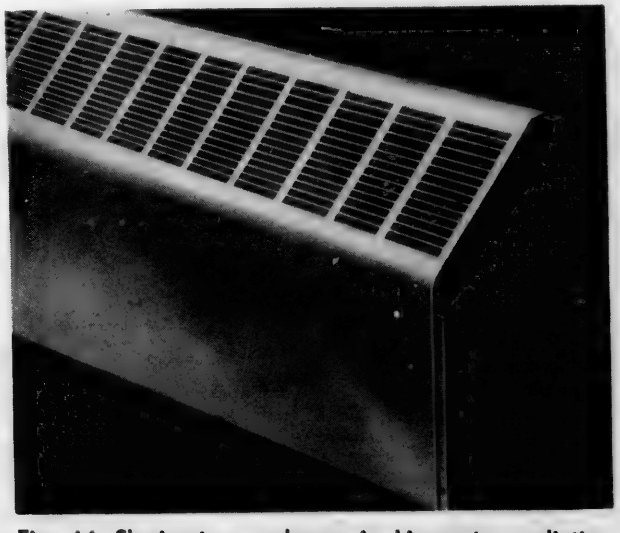


Fig. 14. Sloping-top enclosure in Linovector radiation line. The Vulcan Radiator Co., Hartford, Conn.

Fig. 15. Library application of Wall-Fin radiation line. The Trane Company, La Crosse, Wis.

level, multiple-tiered installations is inverted mounting of the sloping-top enclosure.

The Trane Company, La Crosse, Wis. (Fig. 15). Wall-Fin radiation is available in two basic cover types, sloping-top enclosure, and flat-top enclosure with top louvers. For non-ferrous elements, a Kinetic Orifice inner tube is optional. This tube-within-a-tube feature provides even steam distribution the full length of the heating element.

The Vulcan Radiator Co., Hartford, Conn. (Fig. 14). Linovector commercial and industrial finned-tube radiation is manufactured in ferrous and non-ferrous styles by this company. For use with all heating elements are two cover styles, sloping-top enclosures, and a flat-top enclosure, designated Sill Trim, with louvers on front and side. In addition, a baseboard-like enclosure, Lino-Trim, is available for multiple-tiered installations.

Warren Webster & Company, Camden, N. J. (Fig. 16). The company's Walvector finned-tube radiation is available with copper tubing, in either plain ends for sweat connections or threaded brass connections, and aluminum fins. Heating elements are accommodated in a flat-top cover, a sloping-top enclosure, and, in the Custom Walvector series, a variety of flat-topped enclosures. These include top-louvered and front-louvered types for regular wall mounting, and both top-louvered and front-louvered models with an integral sill extension.

Fig. 16. Auditorium application of Walvector finned-tube radiation. Warren Webster & Company, Camden, N. J.

Fig 17. Inverted mounting of Finmaster sloping-top enclosure. Sterling Radiator Co., Inc., Westfield, Mass.

I-B-R Ratings

Prior to 1950, ratings of finned-tube radiation were not based on any recognized standard procedure for determining the actual output. The I-B-R Baseboard Code was issued by the Institute of Boiler and Radiator Manufacturers in July, 1950, after several years of investigations as part of the Institute's research program at the University of Illinois. It is the only recognized standard for determining the accurate output of baseboard (finned-tube) radiation.

The Code specifies the rigid conditions under which tests are to be conducted, either in the manufacturer's laboratory or in the Institute's new laboratory for check testing at Urbana, Ill. The I-B-R Rating, as certified by the Institute's seal, is output found by test, plus 15%.

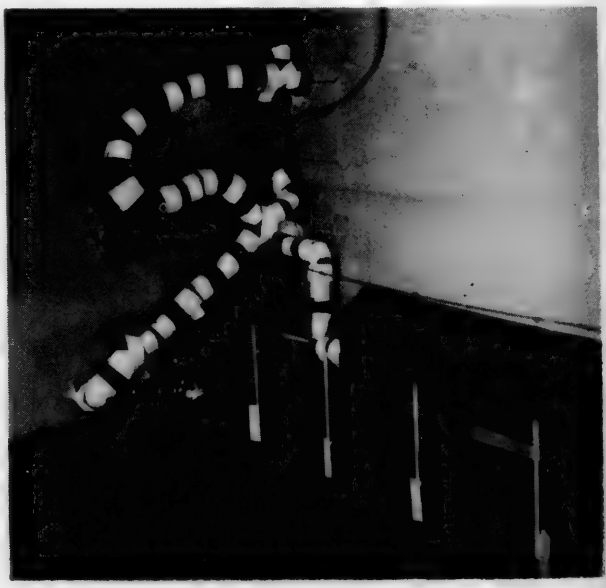


Fig. 18. Test set-up in manufacturer's laboratory for output rating of unit in Wall Radiation line. Fedders-Quigan Corp., Trenton, N. J.

Design and Features of Traps

Designation of the proper steam trap to use in order to have the trap operate at maximum efficiency, is predicated on an understanding of the design of these traps and their limitations. Not only are the various types of traps described and illustrated, but information is presented to provide a basic understanding of their characteristics. This feature is Part I of an extensive article.

ABOUT ninety years ago, steam traps were designed solely to remove condensate, generally from old style radiation of large volumetric capacity. In such radiation, air and particularly water retention could be considerable before difficulties developed. Since quiet operation was not very essential, and poor effectiveness less costly and also little understood, it was a long time before serious thought was given to air removal other than by a manually operated air cock. Air binding was a familiar thing.

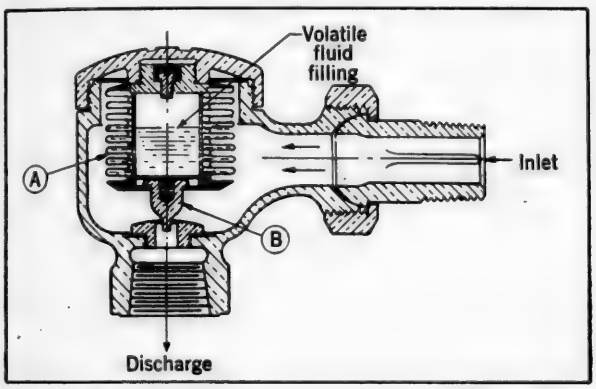


Fig. 1. Section of a thermostatic trap.

In an effort to minimize these troubles, the development of various kinds of steam traps came about.

A steam trap can be one of the most wasteful units in the whole plant or it may be a most efficacious and ever-watchful guard against waste of steam. The trap can speed the output of any machine to which it is connected. If it is correctly chosen, it can easily increase the output of a plant or machine 100% and still save steam.

To be effective, in addition to collecting the condensate and discharging it without allowing steam to pass, the steam trap must be capable of passing all air and other non-condensable gases as soon as they reach the trap because air in any kind of steam heated apparatus will retard the flow of condensate to the trap. This air will create cold spots in the machine or heater and it will reduce the output of the equipment to an unbelievable extent. This is due to the fact that when air and gas mix with the steam, they lower the temperature of the resulting mixture and this retards the heat transfer in the apparatus.

There are many varieties of traps but the ones commonly used include the low pressure thermostatic trap, float-thermostatic trap, inverted bucket trap, vertical open top bucket trap, and impulse trap. Other types are liquid expansion trap, metal expansion or bimetallic trap, and siphonic trap. These types will be explained and information presented regarding design and operation.

Thermostatic Trap

A typical low pressure thermostatic trap is shown in Fig. 1. Reference to Fig. 1 and 2 will clarify its design and construction. The trap has a motor element *A* which automatically opens the valve *B* to allow condensate to pass and to close it to prevent steam escaping.

The element, a sectional view of which is shown in Fig. 2, is partly filled with a volatile fluid having a boiling point a few degrees lower than that of water. It is important that this pressure-temperature differential remain fairly constant throughout the normal working pressure and temperature range of the trap.

As an example, when a thermostatic trap is fitted with an element that is charged with fluid *X*, and is working with steam at 10 psi (240 deg F) with condensate collecting in the body of the trap at temperatures up to 230 deg, the element will have an internal pressure of 10 psi or a pressure that balances that of the steam. Any slight increase of condensate temperature above 230 deg will immediately produce an extra pressure inside the element. When the temperature increase is sufficiently high, it will cause the bellows to expand, and when there is sufficient internal pressure, the bellows will expand enough to close the trap completely.

For any given steam pressure, a suitable filling can be chosen which will operate the trap at any desired condensate temperature. On this principle, thermostatic traps are made self-adjusting for any steam pressure from sub-atmospheric up to the maximum steam pressure

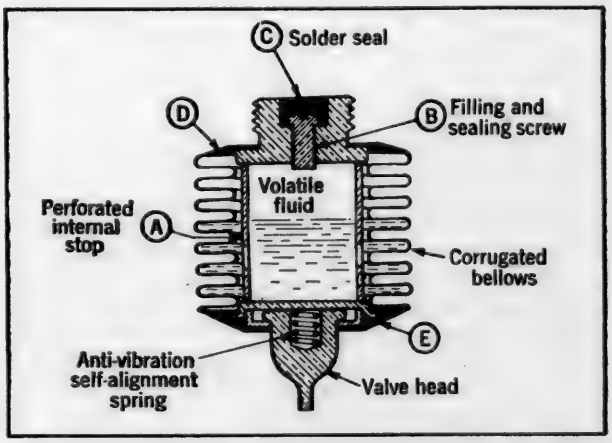


Fig. 2. Section of a motor element.

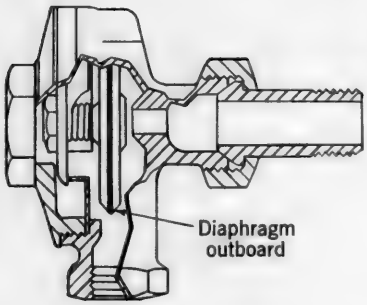


Fig. 3. Thermostatic trap with outboard element.

for which the trap is built. By attempting to use traps constructed and filled exactly alike over a wide range of pressures, there is a danger that the operating temperature will not follow that of steam and water and best conditions will not result.

As to the best operating temperature for a thermostatic trap, this is something which depends entirely on the particular equipment to be drained. When dealing with low pressure steam heating, if a thermostatic trap is to be used for draining a steam main, it should work fairly close to steam temperature, say within 8 or 10 deg of the steam, otherwise there is grave risk of water being held up in the main and causing trouble.

There is a disadvantage, however, in making a thermostatic trap work too close to steam temperature because of its tendency to reduce the closing power of the trap, with the result that should a very small amount of dirt collect on the head or seat, it may prevent the seat from making good contact.

Thermostatic traps provide economy in steam usage because they extract more heat from the condensate and reduce thermal losses of piping. However, they are not ideal for use with unit heaters where results at the heater and economy of heater operation are more important. Thermostatic traps may hold up condensate in the heater, in this case awaiting sufficient cooling of the condensate. Of course, the condensate in a waterlogged heater will quickly cool by forced convection, but the condensate in the trap itself can cool slowly only by natural convection. Hence, the condensate in the heater can be quickly dropped to quite a low temperature with undesirable effects on the air stream temperature.

Thermostatic traps are also unsuited to drainage of unit heater and blast coil applications because in such applications they may receive sudden gulps of overhot condensate even when a cooling and storage leg is provided. For such fluctuations a thermostatic trap is apt to be too sluggish, particularly with age, thus causing water logging, possible freezing of a coil and bursting of tubes.

Thermostatic Element, Outboard or Inboard?

Should the thermostatic element of a thermostatic trap be outboard, Fig. 3, in the return where it could be less affected by pressure and temperature, or inboard, Fig. 4 and 5, on the radiator side of its discharge point where conditions were more pressurized and usually hotter? It could be argued to advantage either way, inboard or outboard. Some manufacturers who made the outboard type, for various reasons, either changed to the inboard type or added it to their line.

Basically, the term "inboard" means within the steam and "outboard" outside of it as soon as the steam passage is closed.

As a rule, the inboard type is considered the proper trap where a close differential is desirable as with convectors; the outboard type is proposed for use with high pressure steam or where condensate is corrosive. For various reasons, the thermostatic element in traps will generally be found arranged for inboard operation, although one good reason is that this provides a desirable close differential. When steam is shut off, pressure drops faster than the temperature of the element. This tends to strain the element of either type, particularly so with high pressure steam, but in the case of the outboard type, this tendency and unbalanced pressure exist even when steam is on in the case of the outboard type.

There is not any noticeable difference with either type. If the outboard element sometimes hammered on one job, its disagreeable action was likely to be obscured by the sometime chattering of the inboard element on another job, whenever some other trap blew back steam and closed the trap from the return end. Each occasionally made noise or gave other trouble usually due to improper piping installation, operation or maintenance. One worked with the steam pressure and the other did work against it. It was never learned what the relative merits of these two trap types would be when installed on ideal systems under ideal operation.

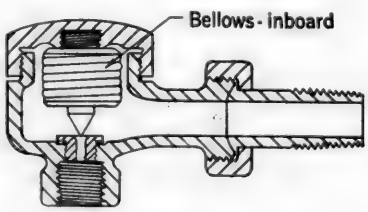


Fig. 4. Thermostatic trap with inboard element.

An outboard trap must pass some steam before its operation is affected, although such operation should prevent or reduce steam locking before the trap—a condition where steam between equipment and trap must be condensed before condensate can reach the trap. A further point is that the outboard location of the element should tend to reduce or eliminate any environment of superheat. This is considered an advantage only if it is agreed that superheat exists in the heating system sufficient in amount to be detrimental to traps. The outboard element does tend to eliminate the need for a cooling leg. It also provides a valve seat which tends to be self cleaning, because of its vertical position.

While there are things favorable to the outboard trap, an offsetting factor would be that with the element outboard, that is on the discharge side of the trap, the element would lose its otherwise characteristic self-

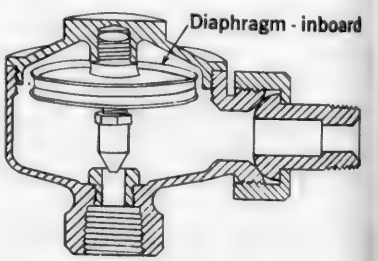


Fig. 5. Thermostatic trap with diaphragm inboard.

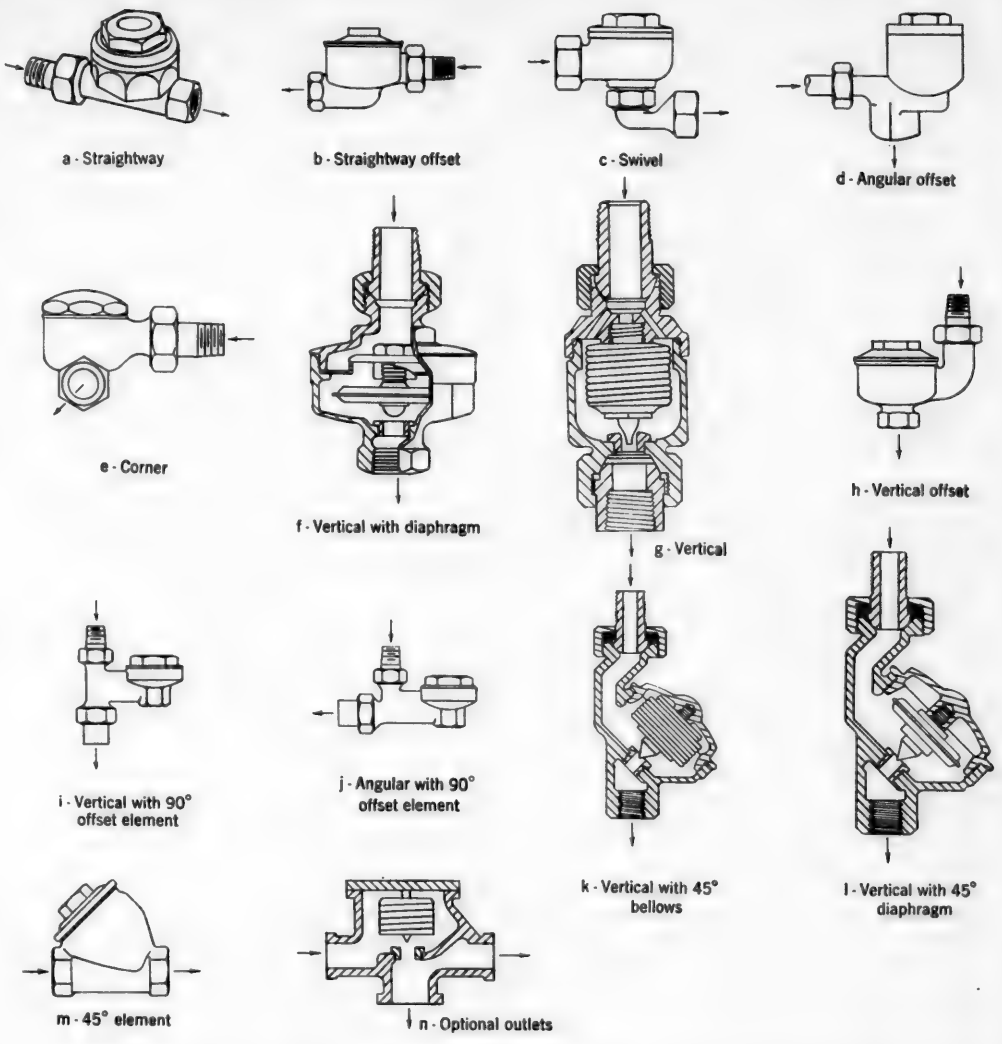

a - Straightway
b - Straightway offset
c - Swivel
d - Angular offset
e - Corner
f - Vertical with diaphragm
g - Vertical
h - Vertical offset
i - Vertical with 90° offset element
j - Angular with 90° offset element
k - Vertical with 45° bellows
l - Vertical with 45° diaphragm
m - 45° element
n - Optional outlets

Fig. 6. Various patterns in which thermostatic traps are available.

adjusting properties as previously related. In this location the sealed volatile liquid is not located where it can respond to both pressure and temperature throughout its entire specified steam range.

The relative merits of inboard and outboard traps is reviewed to round out trap knowledge and trap characteristics.

Diaphragm or Bellows for the Element

The motor element of a thermostatic trap may be in the form of a diaphragm, Fig. 3, or a bellows as illustrated in Fig. 4.

In the bellows type of thermostatic element, the movement per corrugation of the element for a given valve movement is much less than with a diaphragm type element where movement takes place at the weakest points around a circle or circles on top and bottom discs, and alternates in opposite directions. A bellows may have a helical or screw-like formation with a series of spring-like bending movements. Bronze in a diaphragm fatigues less rapidly than many other metals, but stainless steel is sometimes substituted for other reasons. The use of diaphragm elements is generally confined to low pressure vapor or vacuum heating systems. To decrease movement of diaphragm elements, the valve openings or orifices are sometimes made larger. Such traps have larger valve contact areas and are therefore more difficult to keep closed tightly.

A manufacturer does not necessarily use either a bellows or a diaphragm element in his traps. He may use a diaphragm type in traps up to 15 psi and a bellows type in traps for higher pressures. As a rule, the thermostatic element in float and bucket traps is of the diaphragm type. When of the bellows type, it will be arranged for inboard operation, Fig. 4, and almost invariably located inside of the trap body. (A section of a trap for outboard operation is shown in Fig. 3.) When a high pressure steam main closes down, the internal pressure of the element is high at a time when tensile strength of solder is but a fraction of the strength it has after cooling. The cost of the bellows type is not much greater than the cost of the diaphragm type.

Certain makes of bellows elements are filled under a vacuum. The advantage of this is that the trap valve will go to the closed position should the element fail, thereby preventing the passage of steam. Furthermore, the failure of the trap will be detected sooner because the radiator to which it is attached will stay cold. Traps with elements not filled under vacuum may remain open on failure and lose their volatile liquid, usually alcohol, or sometimes a more expensive medium. Therefore, where there are many such traps, there is more periodic

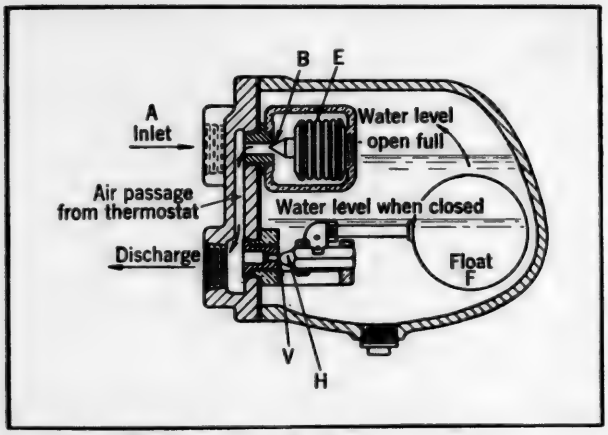


Fig. 7. Section of a float-thermostatic trap.

testing and inspection to determine which traps are not functioning properly. Since the diaphragm trap does not close on failure, it is a non-freeze trap at all times. Both diaphragm and bellows type elements are heat motors which, to close, must expand by absorbing heat, and to open, must contract by dissipating heat. In manufacturing the bellows element, the free length before sealing is made greater than the length required to close the trap. The bellows is then collapsed against internal stops, partially filled with water, evacuated to a high vacuum, and sealed.

During operation, this trap is normally open and only starts to close when internal and external pressures approach equalization. With increase in condensate temperature, heat is absorbed by the water within the bellows until the internal vapor pressure equals or exceeds the surrounding pressure, thereby permitting the bellows to expand. Any heat source at higher temperature will close the trap.

Thermostatic Traps With Various Angles

Thermostatic traps, whether diaphragm or bellows type may be obtained in numerous patterns to suit unusual piping and physical conditions. Copper pipe may be used. These patterns are exclusive of the familiar right and left hand, angle and straightway offset patterns with or without male or female unions.

Referring to Fig. 6, *a* is a straightway without offset, *b* a straightway with offset, *c* a trap to swivel to any angle, *d* an angular offset trap without swivel, and *e* a corner trap. Vertical traps are shown in straightway, *f-g*, offset *h*, and vertical trap with 90 deg offset element, *i*. An angular offset element is shown at *j*. Vertical traps are also made in the 45 deg pattern *k* and *l*, and there is a 45 deg trap for horizontal piping *m*. The vertical and 45 deg patterns are particularly applicable to convectors and radiators, and radiators with bottom outlet where all piping must be horizontal or vertical or close to the floor or wall. The trap shown in *n* has optional horizontal or vertical outlet and is particularly suitable where piping is close to the floor. It is not freeze proof, nor is *m* when it is installed horizontally.

The method of connecting a trap and the angle at which it is installed can sometimes affect a trap favorably or otherwise. Thermostatic traps of the ordinary angle type can have the seat orifice turned from usual horizontal plane to a vertical one to improve the venting of air and increase production in process work where a vessel is opened to the atmosphere during a cycle and a separate vent is not provided. This method has been used in heating systems to obtain greater pitch for return lines, by simply turning the angle trap on its side, which incidentally saves an ell in the piping.

Although thermostatic action of a trap turned at an angle remains the same, capacity is slightly increased due to the condensate leaving the trap without creating a vortex, as occurs with any bottom outlet from a vessel. However, the most important thing achieved is that air can leave the trap unimpeded. Because there is no vortex, the air flows over the top of the condensate. This also increases capacity. On the other hand, there are some possible slight disadvantages. The trap may retain some water and sediment; condensate contacts only a portion of the thermostatic element and the water seal over the orifice is lost, since condensate would not normally rise to a level at which the orifice would be covered.

Float and Thermostatic Trap

The principal characteristic of a float-thermostatic trap is that it discharges the condensate at practically the same temperature as that of the steam except for a slight cooling effect which takes place within the trap body. The rate of discharge from these traps is very consistent depending almost entirely on the rate at which the condensate reaches the trap. This is not a trap with an intermittent action.

In Fig. 7, as water enters the *A* inlet and collects in the body of the trap, it raises the float *F* which in turn opens the discharge valve *V* to permit the condensate to pass out at a rate depending upon the distance which the valve head *H* moves away from its seat. This distance is governed by the upward movement of the float. Provided that the trap has sufficient capacity to deal with all loads placed upon it, the discharge is maintained at the same rate as the water flow into the trap.

As soon as the condensate ceases to enter the trap, the water level and the float fall until a level is reached where the valve closes entirely. As long as the discharge valve is always submerged, no steam can reach it. Since the lower stratum of water which surrounds the valve and seat is invariably somewhat cooler than the steam, it protects the valve and seat from the steam's erosive action.

The valve mechanism is so constructed that it is possible after removing the body, to lift the float sufficiently

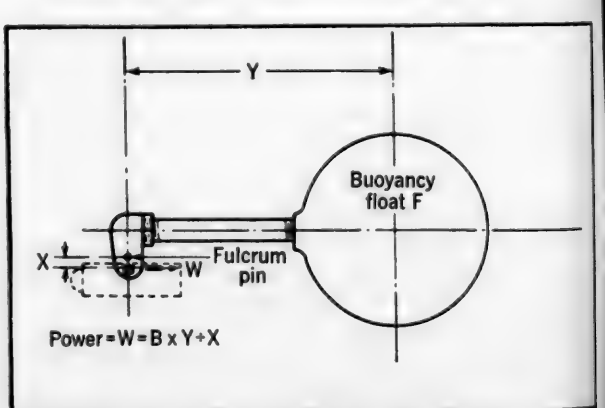


Fig. 8. Details of a float.

high to allow the valve head H to be removed with the fingers so that it can be cleaned, ground in, or replaced with a new one in a short time.

The thermostatic air vent E which is placed as high as possible in the trap body operates as does a similar element in a thermostatic trap.

When cold, the bellows of this element is contracted so that the air valve B remains fully open thus allowing all air and other incondensable gases to pass freely through the trap to the outlet. As soon as the steam enters the trap body and surrounds the element E, it causes this element to expand and close the air valve, leaving the float to operate the valve V and to take care of only the condensate entering the trap. When air is carried along with the steam, as is invariably the case, especially when makeup feed water is used in the boiler, it will, on entering the trap, slightly reduce the temperature in the upper part of the trap surrounding the E element. This causes the element to contract and to open the air valve sufficiently to allow the air to escape. This enables the water to enter the trap freely so the float can function according to the amount of condensate collecting.

It is easy to see how important it is to have a thermostatic element in these traps that operates at temperatures fairly close to that of the steam. If the element should operate at a temperature much lower than the steam, air will be allowed to collect inside the trap and may seriously retard the flow of water, gradually holding up the condensate and considerably reducing the output of the trap. Often a trap may be blamed as being too small when the whole trouble is due to a sluggish air vent element.

The capacity of the float and thermostatic trap cannot be judged by the size of the body or by the area of the seat orifice. The operating power of this trap depends upon the buoyancy of the float and the mechanical advantage of the lever mechanism; while the size of the seat orifice, the shape of the valve head, and the movement obtained are factors controlling its capacity. The power required to open the discharge valve V against the internal pressure can be better understood by reference to Fig. 8. Here the buoyancy of the float is represented by B.

To find the power W to lift the valve from the seat, we have

$$W = (B \times Y)/X$$

Where Y is the distance from the fulcrum to the center of the float and X is the distance from the fulcrum to the valve pin.

Since the mechanical advantage of the lever mechanism is Y/X, then any decrease in the dimension X in this equation will increase the mechanical advantage correspondingly. Therefore, by making the distance X short, it is possible to obtain greater power and consequently a larger seat area with a relatively short arm Y. The advantage of the particular mechanism shown in Fig. 8 is due to the fact that X, being made very short, allows greater leverage, so that considerable power and large capacity are obtained with a compact mechanism which can be housed in a small trap body. However, if X is too short, the leverage is too small and the travel is restricted. The valve will not get far enough away from the orifice to gain full orifice opening.

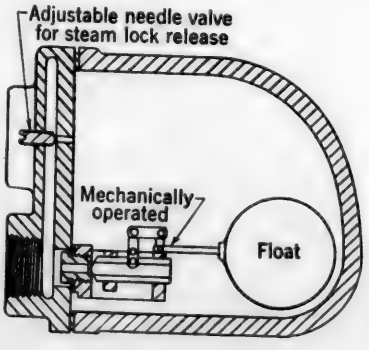
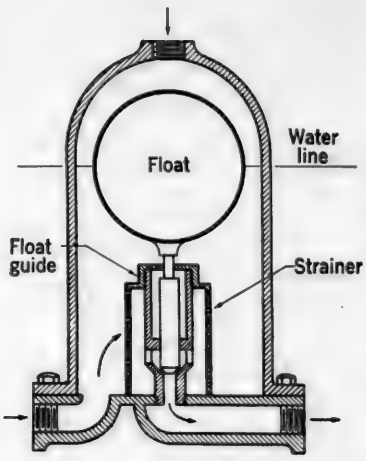


Fig. 9. Details of a float trap.

Fig. 10. Details of another type float trap.



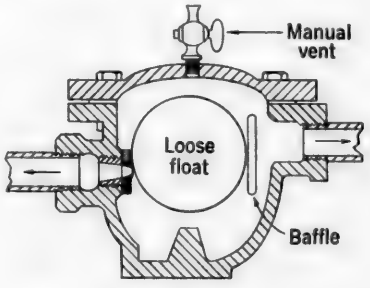


Fig. 11. Free-floating ball float.

Because of the very large and steady discharge obtainable with a well designed float-thermostatic trap, with the free gravity flow of water through the trap even without the aid of steam pressure, the float-thermostatic trap is, undoubtedly, the best and most suitable trap for all low pressure heating mains and heating units. It is also one of the most suitable and reliable traps for low and medium pressure industrial work where the water has to be carried away at high temperatures.

Closed Float Traps

Float traps may have a float mechanically connected through levers or other mechanism, Fig. 9 and 10, or the ball float may be loose or free floating, Fig. 11. The unit is called a mechanical trap, because it is operated mechanically by a float regardless of condensate temperature. For the same reason, bucket traps are likewise called mechanical traps.

The free-floating float trap is a simple trap without moving parts to wear, other than the ball which also acts as a valve. The buoyancy force of the float must be made greater than the force created by the steam pressure

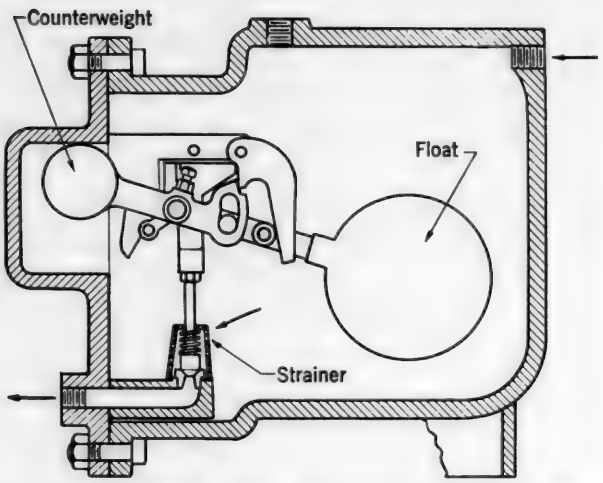


Fig. 12. Discharge valve operated by counterweight.

which forces the float towards the seat. The float must be strong enough to withstand the steam pressure.

The higher the steam pressure, the smaller must be the valve or the larger must be the float to enable the buoyancy of the float to open the valve. However, large floats have a greater tendency to collapse. Levers and toggles can provide mechanical advantage for increased power without increasing the buoyancy force, and any increased weight of float can be counterbalanced by

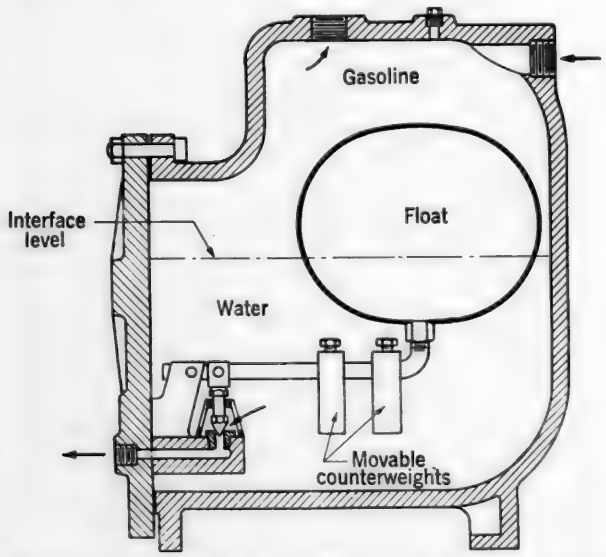


Fig. 13. Trap suitable for draining water from steam and air lines.

weight or by spring. The float can be made heavier than water or it can be made of solid aluminum to prevent collapse or waterlogging. The latter is not detrimental if it can be properly counterbalanced for such a condition.

In a float trap, the ball is only partially submerged and its buoyancy is decreased if the float becomes water logged; or the valve size is increased, or becomes so by wear from wire drawing. The same is true with increase in steam pressure, or increase in temperature, which, in turn, decreases the density of the water. Since buoyancy depends upon weight of water displaced by the float, the float need not necessarily be light enough to float on the condensate. The float can be made heavier than water because its weight under water will be as much less than its weight out of water as the weight of the water it displaces. It can even be of solid aluminum by using adequate counter balance or spring tension.

While the trap in Fig. 12 has a float, it is not in reality what is commonly called a float operated trap for the float functions by trigger mechanism to release the counterweight which as it falls, positively opens the discharge valve. Power for valve operation does not depend upon the buoyancy of the float. At a fixed level, after discharge, and above the valve opening, the float lever disengages; the weight is returned to the high position in which the valve is closed. The trap shown in Fig. 13, when used without counterweights, is suitable for draining water from steam and air lines and the low spots in gasoline pipe lines.

Although ball float traps have such small water storage capacity in the trap body that they may close but briefly, in some applications with only an infrequent or small amount of water, they may be relatively poor air removers. This is because the ball needs sufficient water and also time to allow for the passage of air. Continuous condensate flow, as often occurs with certain equipment, is therefore desirable. Turbulent flow can make the float bob about a bit to blow some steam and, therefore, the inlet or float is often baffled to minimize the bobbing effect. As dirt on the valve seat can cause steam waste, the seat should be clean. If the valve stem is vertical, Fig. 14, instead of horizontal, there will be less trouble in this respect, particularly where oil is present. With the float type of trap, condensate is received by gravity without the need of any steam pressure to force it up through the trap, as with an inverted bucket trap. Discharge is at steam temperature, increasing the tendency to flash steam.

Theoretically, a float trap has continuous flow, but on light loads its action is intermittent. This helps to reduce wear on valve and seat, as can occur with continuous flow where the opening is but cracked. The water seal of a trap blocks the passage of steam-air also, during non-discharge where discharge is infrequent, and there is no separate automatic means of air removal. Air cocks, usually installed, provide only manual relief. The water seal provides a slight cooling effect which is more pronounced when but little water is passed and the trap body is large. Coolness and the absence of steam flow give longer life to the valve and keeps the valve tighter. Since the valve is closed when the trap has finished its discharge, no priming is required. With some makes, the trap interior is not accessible without trap removal.

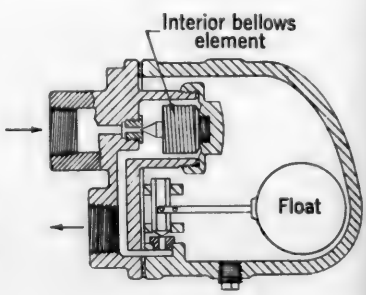


Fig. 14. Trap with vertical steam keeps the seat clean.

High Pressure Float Trap

Where float-thermostatic traps are used in connection with high pressure steam, it is advisable to have stainless steel or monel metal floats, since these can now be constructed to withstand high pressures and temperatures. Since the power available to operate the valve depends upon the buoyancy of the float, it is advisable to choose a float having the greatest lifting power for its size and strength. For high steam pressure, a strong and expensive float has to be used. Therefore, inverted bucket traps which are cheaper to make, become more attractive at higher pressures. A high pressure float and thermostatic trap is illustrated in Fig. 15.

The thermostatic element used on high pressure float traps should be constructed to withstand the extra strain and stresses associated with high pressure steam. It makes little difference whether the steam pressure is acting on the outside of the element or whether the element is situated to have the inlet under the valve head. If it is placed so that the steam pressure surrounds the element, then the pressures will be balanced while working, but every time the steam is shut off, there will be a full, unbalanced pressure. If the inlet is under the valve head and no pressure exists surrounding the bellows, then as the metal of the trap heats up to steam temperature, there will be a very great unbalanced pressure on the element at all times. In either case, an ordinary thermostatic element is not suitable for these high pressure traps.

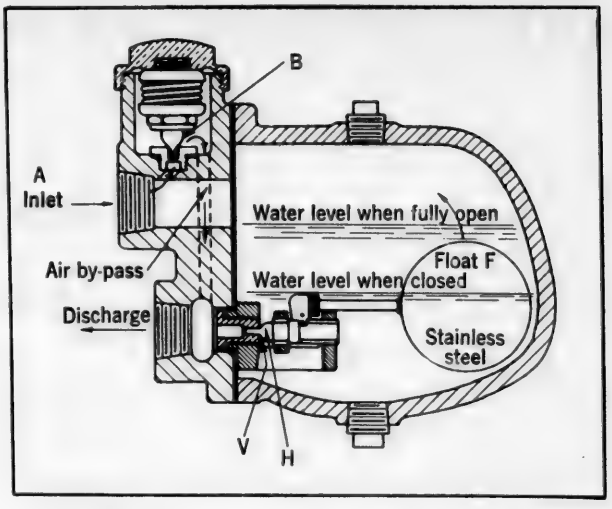


Fig. 15. High pressure float and thermostatic trap.

Method for Cooling Electronic Equipment

An improved method for cooling electronic equipment on board ship has been under study by the National Bureau of Standards. The method is based on transferring heat from the equipment cabinet through an intermediate coolant to sea water as the ultimate heat sink. Although undertaken for the Navy Bureau of Ships by P. Meissner of the Bureau staff to solve a special design problem in heat transfer, this technique could be applied to other than shipboard equipment, and tap water could be used instead of sea water.

The rapidly increasing use of electronics aboard modern naval vessels has placed increased demands on shipboard cooling equipment. Present-day equipment relies for cooling primarily upon compartment air provided by the vessel's ventilating and air conditioning system. The heat generated by these electronic devices imposes a burden on the ship's facilities and could subject the equipment to dangerous overheating in the event that the cooling system should be shut down in an emergency. In addition, the exhausting of heated air into the equipment compartment constitutes a hazard to operating personnel. A solution to these problems can be achieved by transferring heat from the equipment to sea water through an independent cooling system, rather than relying upon compartment air.

The NBS study was concerned with a system that would be readily applicable to existing equipment of conventional construction. Present equipment is cooled primarily by air convection. If the equipment cabinets were enclosed and the air within the cabinet recirculated, a closed forced-convection system could be obtained. An air-to-liquid heat exchanger located within the cabinet could transfer heat from the air to an intermediate coolant which, in turn, would give up its heat to sea water. By using an intermediate coolant, such as fresh water, the practice of piping sea water about the vessel could be avoided. The feasibility of this method depends largely on whether the equipment can be maintained at safe operating temperatures in locations where sea water is at its warmest.

The temperature of sea water ranges from —2 to 30 deg C. The intermediate coolant is therefore available at an upper limit of about 35 deg, while cooling air can be supplied to the equipment at about 43 deg. The temperature differentials are necessary for the efficient operation of the heat exchangers. Since there are many military-approved components suitable for operation at 43 deg C, this temperature would seem to be a safe upper limit. However, the temperatures of components inside large, dense equipment may be much higher than for components operated singly out in the open. Since natural convection cannot be relied upon, the application of forced convection was investigated.

Examining the thermal characteristics of electronic components reveals that they can be grouped roughly into two broad categories. Such components as capacitors, transistors, and semi-conductor diodes are restricted to the lower operating temperatures, but generally produce little or no heat. The major heat-dissipating components, such as tubes, transformers, power resistors, and dynamotors, are usually less sensitive to high temperatures. To minimize heating of the more sensitive components by the major heat sources, the two classes of components are arranged on opposite sides of a metal sheet. The cooling air is forced to flow through perforations in the sheet around the base of each heat-producing component. Thus, the cool incoming air below maintains the sensitive components at the lowest possible temperature, and is still available at nearly the inlet temperature to cool the heat-producing components above. The heated air is then drawn through the air-to-liquid heat-exchanger, cooled, and recirculated within the cabinet.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Plumbing Systems for Hotels

ONE type building in which the design of the plumbing system is a major consideration, is the modern hotel. Here the same care and consideration must be given to the plumbing system and fixtures as is afforded to the room layouts and the selection of the furniture and appointments. A few of the different plumbing systems normally included in the average hotel are as follows.

1. Sanitary system
2. Storm water system
3. Cold and hot water
4. Chilled drinking water
5. Vacuum cleaning system
6. Fire standpipe
7. Partial sprinkler system
8. Gas, when required.

In this article, no attempt is made to cover all the systems mentioned but rather just concentrate on the sanitary and waste roughing and the pertinent facts about the fixtures used in hotel rooms. The care with which the plumbing systems are designed and the fixtures are selected, reflect the attention given by the engineer, and indicates the desire of the hotel owner to offer the best facilities for his guests.

Well planned facilities do not necessarily mean the most expensive fixtures and system materials but instead means the care was given to the design and selection to ensure obtaining the proper function in each system. In order to point out the desirable features in hotel bathrooms, we shall start with the arrangement of fixtures in this room. Figure 1 represents a typical layout of such a room showing the general placement of fixtures.

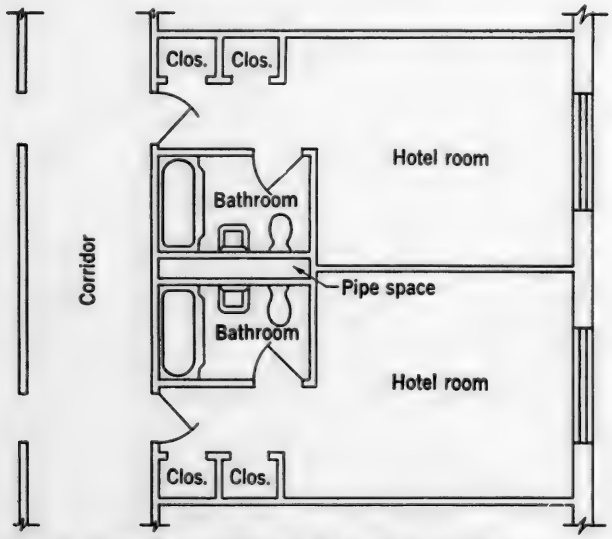


Fig. 1. Typical arrangement of hotel rooms showing back to back fixtures in the bathrooms.

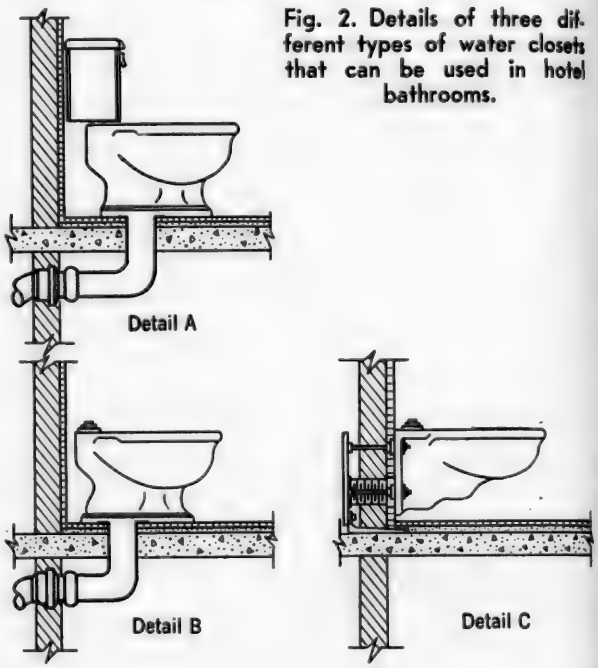


Fig. 2. Details of three different types of water closets that can be used in hotel bathrooms.

Although the physical dimensions of the bathroom, as well as the placement of the fixtures, is the responsibility of the architect, it is an established fact that these rooms cannot be squeezed down in size as a sacrifice for more space in the hotel room. Instead, the proportions of the bathroom must be spacious enough to offer every convenience to the guest.

It may be mentioned here that the layout of the hotel rooms shown, is only for the purpose of example in pointing out the particular room layout used in this article. Referring to Fig. 1, you will note that the bathroom includes a water closet with ample room around it, a lavatory of sufficient size, and a combination tub and shower. Now let us take the fixtures one by one and discuss the desired features that should be considered in plumbing systems.

Water Closets

While there are a number of different styles of water

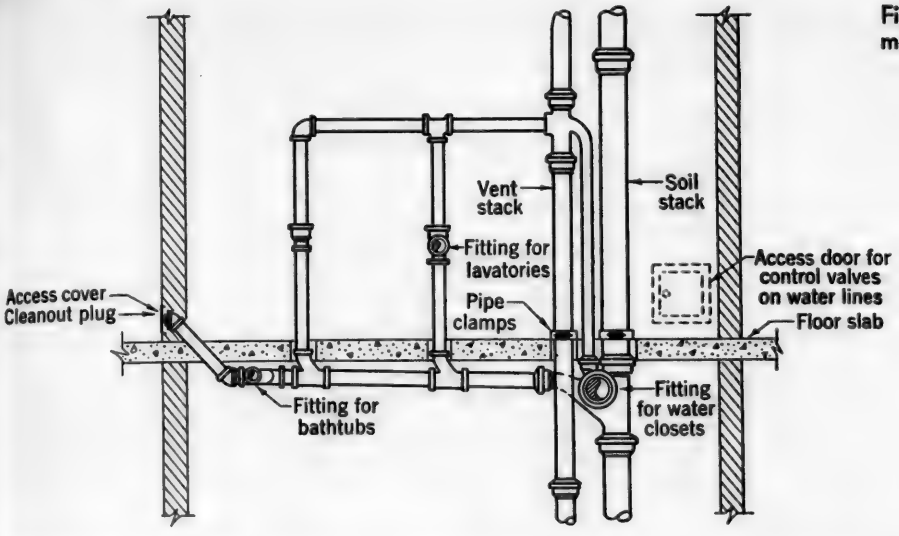


Fig. 3. Elevation showing one method of providing roughing for back to back fixtures.

closets that may be used in a hotel bathroom, these boil down to three specific types as shown in Fig. 2.

Detail *A*, of Fig. 2 shows the water closet and tank combination; detail *B* shows a floor type which utilizes a flush valve, and detail *C*, represents a wall mounted type of water closet. The wall type closet also uses a flush valve. The floor type closets are secured in place by means of closet bolts and a closet flange soldered to the lead bend. The wall type closet is secured in place by means of a concealed carrier that supports the closet free of the wall construction.

Siphon Jet Recommended

The decision as to which water closet will be used is, of course, up to the engineer, architect and hotel owner. Regardless of which fixture is used, it is suggested that the closet be of the siphon jet type since this type is quieter in operation than the blow-out type. A good closet seat should be used because, even though this seat may cost more initially, it certainly will prove its economy over a period of years through its ability to last and retain a neat appearance.

Water Closet Roughing

Figure 3 illustrates how the roughing is arranged for the fixtures shown in Fig. 1.

Figure 3 is an elevation of the roughing that could be employed for the back to back fixtures. The roughing shown is for example only and merely suggests one method of installation that may be employed. Other methods of design, favorable to the engineer or local code can also be utilized. Likewise, the piping materials can be of any one of the various materials as selected by the engineer. The material and type of piping illustrated is only for the purpose of example.

It is good practice to provide a cleanout connection that will permit clearing the horizontal drainage line of possible stoppages. The cleanout piping has been offset above the floor slab as shown to eliminate, to some extent, the possibility of leakage when the cleanout plug is removed. Since the tub is the lowest fixture, a stoppage will cause the waste water to back up into this fixture first. Thus, if the cleanout were installed below the level of the tub, the waste water would flow out of the cleanout when the plug was removed.

The stack connection is intended for a floor type closet. When floor type closets are used it becomes necessary to provide a furred ceiling in the bathroom below in order to conceal the closet bend roughing. If a full furred ceiling in the bathrooms will constitute unnecessary expenditure, then a partial furred ceiling must be provided.

If wall mounted water closets are to be used, the roughing would be similar to that shown in Fig. 4, where the carrier illustrated is actually a combination fitting that is placed in the soil stack and serves as a support for the water closet. Wall mounted closets are definitely required when, by nature of the construction, furred

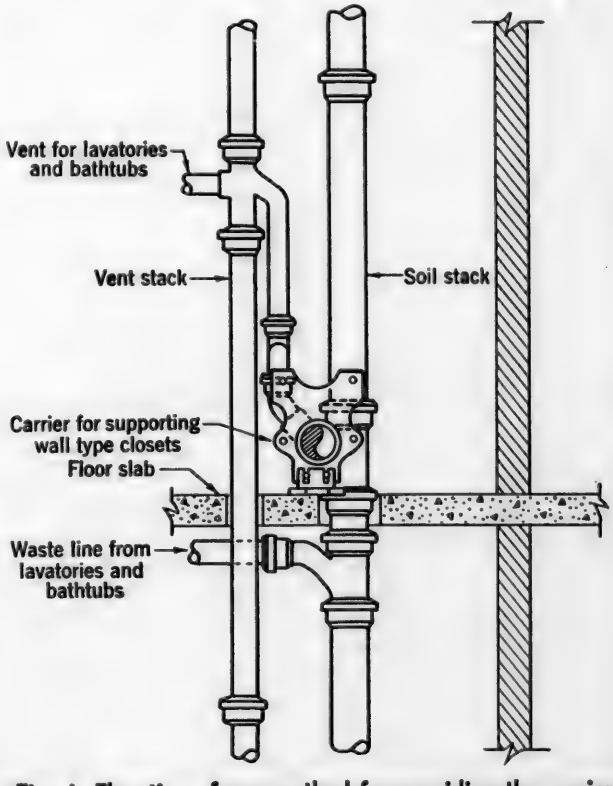


Fig. 4. Elevation of one method for providing the carrier support needed for wall mounted water closets.

ceilings as needed for the floor type closets will reduce the overall ceiling height in the bathroom below.

Section of Water Closet Roughing

Fixtures are installed back to back in a hotel because of the economy gained. Since the same roughing including soil stack, vent stack, waste, vent and water piping will serve both sets of fixtures, a considerable savings is realized. Figure 5 is a typical example of the manner in which the roughing might be installed for floor type water closets that are back to back.

The offset vent stack, of course, is a special item. However, other methods of roughing installation can be used as desired.

When wall type water closets are used, the roughing could be installed in a manner equal to that shown in Fig. 6. Here a manufactured closet carrier is employed to support both water closets. Note that the pipe space required for both the floor type closets, shown in Fig. 5, and for the wall type closets is the same width. A pipe space width of 12 in. was allowed to contain all the roughing including the water piping which was not detailed. A smaller or larger pipe space can be used depending upon the particular design of roughing selected by the engineer.

Exposed flush valves are intended for application with either the floor or wall type closets shown in Fig. 5 and Fig. 6, respectively. If concealed flush valves are contemplated, some type of access panel or door must be included to facilitate maintenance and repair of the flush valve. In this instance, access would be required at each flush valve.

Lavatories

There are any number of different types and styles of lavatories that can be used in the hotel bathroom. The difference in cost varies with the lavatories. Therefore, either the owner must select the type of fixture he prefers for the bathrooms, or the architect and engineer must make the selection within budget limits.

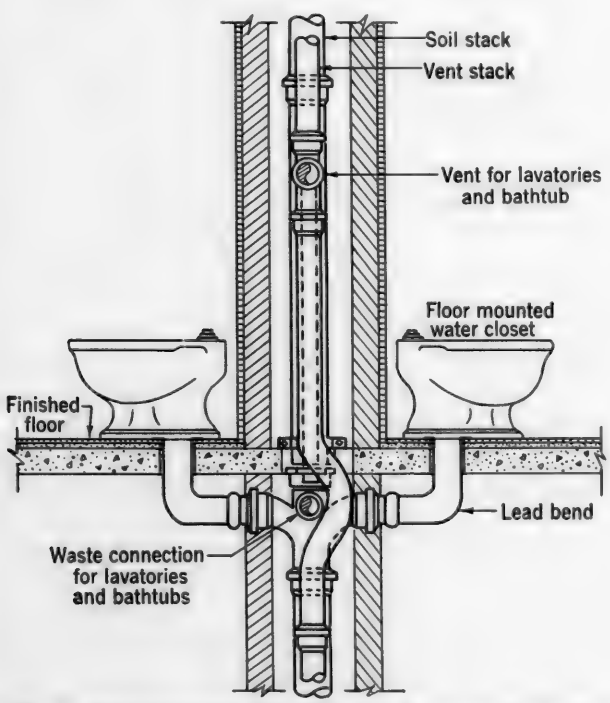


Fig. 5. Arrangement of roughing for floor mounted water closets.

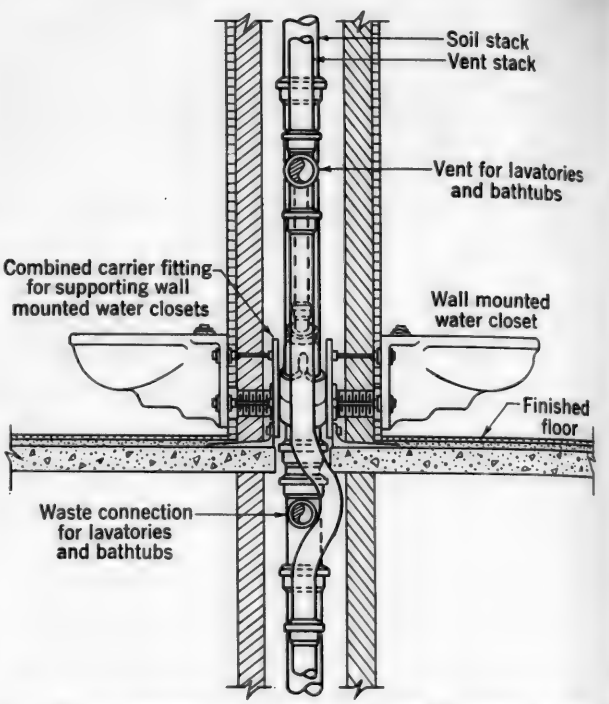

Soil stack
Vent stack
Vent for lavatories and bathtubs
Combined carrier fitting for supporting wall mounted water closets
Wall mounted water closet
Finished floor
Waste connection for lavatories and bathtubs

Fig. 6. Arrangement of roughing for wall mounted water closets.

A typical roughing arrangement for back to back lavatories is detailed in Fig. 7.

In general, the lavatory should be of good quality and secured rigidly in place. The method of securing and supporting the lavatory may consist of a wall bracket that is screwed or nailed to the construction, or a manufactured device comprised of two steel plates bolted together on either side of the wall as shown in Fig. 7. If the lavatory is to be supported free of the wall construction, it can be accomplished by using upright pipe supports, also shown in Fig. 7.

If the lavatory is a deck type without a back, it can be supported by the upright pipe supports and concealed arms that extend into holes drilled into the back of the lavatory to receive the arms. The lavatory is then locked in position on the arms by a special locking device on the arm. Adjustment is made to the locking device by means of holes provided in the bottom of the lavatory for this purpose.

The fixture trim shall consist of separate or combination faucets with a pop-up waste. Many new faucet combinations are now on the market which feature a single control for dispensing cold and hot water. Some provision should be made for a regulated flow of chilled drinking water. Some faucet combinations include this dispenser. Otherwise it is necessary to install the chilled water dispenser, either over the lavatory or in a lavatory punching, especially provided for this device. Since chilled drinking water is much more palatable than the average cold water, this consideration is a very important one for hotels where local water supplies may have disagreeable odors and tastes. Such water must be treated, filtered and chilled to offer it as a wholesome and palatable drink.

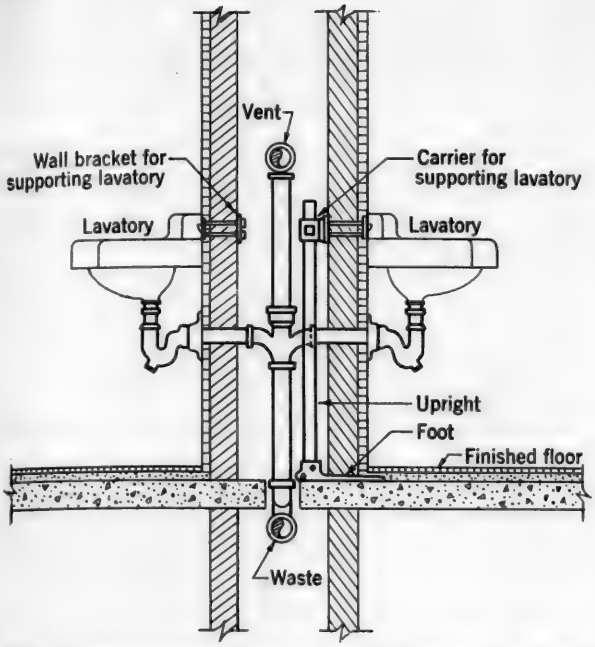


Fig. 7. Arrangement of roughing for lavatories and suggested methods for supporting each fixture.

Bathtub and Shower

A bathtub and shower combination is usually included to offer the transient guest a means of bathing, to which he or she is most accustomed. Some people like bathtubs while others enjoy a shower. The combination bathtub and shower will satisfy either preference. Figure 8 illustrates a typical roughing arrangement for back to back bathtubs.

The trim, consisting of a water control assembly for the bathtub and shower should be of good quality with the faucet handles clearly marked to avoid any possibility of turning on the wrong faucet.

A most vital consideration is positive control of the hot water temperature. In this regard, it is quite important that a mixing valve of excellent quality be specified for the shower. Every precaution must be taken to avoid the possibility of a person being scalded by hot water when taking a shower. A good quality mixing valve is the best insurance against this hazard.

Pressure fluctuations in a hot and cold water line, in addition to being annoying to the bather, can be responsible for a slug of scalding hot water. Therefore, a mixing valve should be sensitive enough to respond to these sudden changes in water pressure or temperature and compensate by regulating the water temperature to a constant limit for the safety of the bather.

Referring to the bathtub roughing in Fig. 8, note the installation of the traps which require a furred or partially furred ceiling below to conceal these devices. If wall type water closets are used to keep the ceiling below free of roughing, the bathtub traps can be so installed that they are contained in the pipe space, thereby avoiding the need for the roughing.

Water Piping

Although the necessary water piping has not been included in the various details of this article, it is important to mention that the piping should be adequately sized to fulfill the requirements of all the fixtures in the hotel. Control valves are needed at each floor level on the branch lines serving the fixtures. In this regard, sufficient space should be allowed between the water closet and the wall, as shown in Fig. 3, to permit the use of an access door for entry to these control valves.

To ensure a quiet water supply system and to avoid the danger of water hammer, water hammer arresters should be included on the branch water lines.

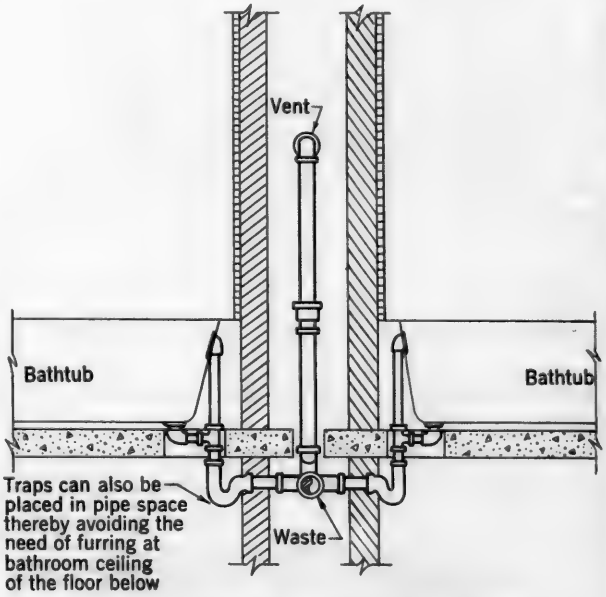

Vent
Bathtub
Bathtub
Traps can also be placed in pipe space thereby avoiding the need of furring at bathroom ceiling of the floor below
Waste

Fig. 8. Arrangement of roughing for bathtubs.

Standard for Measuring Sound to be Prepared

The American Society of Heating and Air-conditioning Engineers and the American Society of Refrigerating Engineers joint committee appointed to prepare a standard for measuring the sound output of air conditioning equipment, will be guided by data developed from a fan-noise program conducted at the ASHAE Research Laboratory, Cleveland, Ohio. This program was an investigation of four methods for determining the acoustic power output of a fan by octave-band analysis.

Previous standards for rating the noise output of fans were based only upon over-all sound levels with little regard for the frequency distribution of their sound spectrum. Experience has shown that this frequency distribution is important both from the standpoint of loudness and annoyance and in choosing the type and method of acoustic treatment needed to reduce the noise level. Relationships between noise level and frequency distribution, and their effects, are sought.

In an air conditioning system the common noise source is an air-moving device, such as a fan or blower, and the noise path may be the duct system which couples the air-moving device to the conditonied space.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing further information on new equipment and materials described in this department.

Aluminum Air Filter

An aluminum, washable, industrial air filter with outstanding strength, rigidity, and lightness is the claim of Research Products Corp., Madison, Wis., for its industrial filter.

Design refinements permit a 175% increase in the aluminum filter media resulting in an increase in structural strength and ruggedness and a significant reduction in overall filter weight, without affecting performance characteristics, the company states. In addition, odor-removal is achieved with the use of Super Filter-Coat, a dust and odor-removing adhesive used to re-coat the filter.

More information? Circle Item 1, postcard, last page.

Oil-Submerged Motor Operator

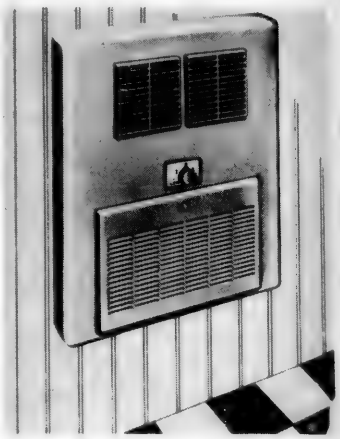
An oil-submerged, spring return, proportional type electric motor-operator designed to control dampers in heating, ventilating, and air conditioning systems plus a wide variety of industrial applications has been added to its motor operator line by Barber-Colman Co., Rockford, Ill.

Motor's gear train and drive are completely submerged in oil and sealed in a die-cast case. Motor may be mounted in any position. Auxiliary switches are readily accessible and simple to adjust. Its output shaft is power operated in both directions to position a controlled device as required when power is on and maintains this position with an internal holding circuit. Enclosed spring returns the controlled device to its normal position on a power interruption. Data sheet F-8354, with complete information is available.

More information? Circle Item 2, postcard, last page.

Residential Fan-Coil Unit

An hydronic fan-coil unit for residences, the Capitolaire VRS, is announced by Heating and Air Conditioning Div., National-U. S. Radiator Corp., Johnstown, Pa. By using chilled water in summer, and hot water in winter, through the same piping, it functions as a year-round air conditioner.



Unit may be tied into existing water heating equipment, or will function as an integral unit of a new system. It fits almost flush with the wall. All outlet connections are concealed. It will fit snugly between studs located on 16-inch center.

Among its design advantages calculated to reduce wear, noise, and maintenance to a minimum are: heavier mounting, aluminum fins on copper tubes, filter removable without tools, variable-speed rheostat (for individual room adjustment), twin-discharge grills adjustable in four directions.

More information? Circle Item 3, postcard, last page.

Germicidal Lamp Installs in Duct

An ultraviolet lamp that sets up a barrier to kill bacteria, virus, and molds, is developed by Westinghouse Electric Corp., Pittsburgh, Pa., for homes, schools, and offices.

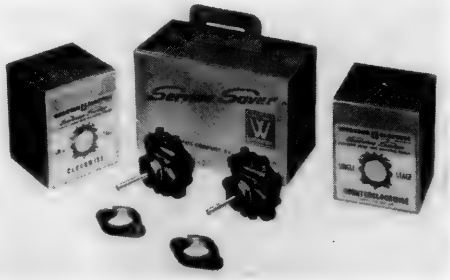
The new lamp, known as Sterilamp, G10T5-½, produces radiation that is from 100 to 1000 times more effective in killing micro-organisms than an equal amount of solar ultraviolet radiation, the company states.

Tube is designed to facilitate installation in a furnace air duct. In most homes it can be installed in a few minutes. A number of manufacturers already have fixtures available for mounting the lamps in ducts and several furnace and air conditioning equipment manufacturers plan to make an ultraviolet germ-killing unit available as optional equipment in 1958 units. Over-all tube length is 14¾ inches including base pins. Rated life for the hot cathode is 7500 hr.

More information? Circle Item 4, postcard, last page.

Fuel-Unit Replacement Packages

Webster Electric Co., Racine, Wis., is offering to the oil heat trade two universal replacement pump and mounting flange packages that are said to reduce by 50% or more the number of units now required in wholesaler inventories. With these two packages, the company states, the serviceman can replace the fuel-unit on any high



pressure oil burner in a few minutes, without piping changes in most cases. A new groove machined into the hub of the ServiceSavers permits mounting in any position, for quick, easy installation.

Two single-stage units, one having clockwise rotation and one counterclockwise, each with a universal mounting bracket, are packaged in a handy carry-out carton. Two 2-stage units also are packaged in the same manner. Each unit within the carry-out pack is separately packaged and identified as well.

More information? Circle Item 5, postcard, last page.

Double Hung Windows Tilt Inward

Industry's search for a double hung wooden window for homes and apartments which can be washed on both sides from within the room without removal or interference with the air conditioning unit has been concluded successfully by the development of a new operating mechanism by Safety Window Hardware Corp., Brooklyn, N. Y.

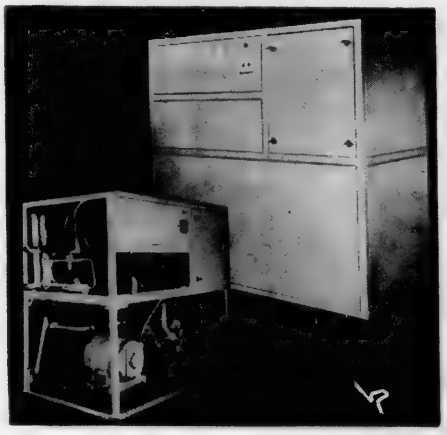
Research by Sharon Steel Corporation of Sharon, Pa., provided a special type of galvanized steel, Galvanite, with self-lubricating properties which would permit satisfactory operation of the intricate metal hardware assembly.

Each window raises and lowers vertically by means of spiral balances enclosed in the side units for each sash. Pulling to a horizontal position is achieved by means of specially designed hinges attached to the bottom of each shaft which permit the sash to be held automatically in either horizontal or inclined position. After cleaning or painting, the sash is merely pushed back in place where it is held automatically. In its inclined position the window serves as a ventilator when air conditioning equipment is not in use.

More information? Circle Item 6, postcard, last page.

Commercial Packaged Unit

According to its manufacturer, Dunham-Bush, Inc., West Hartford, Conn., the CPU packaged central sta-



tion air conditioning system, as illustrated, will save time in planning specifications and save space in job installations. Offered in 10, 15, 20, 30, and 40-ton packages, an evaporator, compressor, evaporative condenser, fans, motors, refrigerant piping, and controls are enclosed in an attractive gray enamel casing.

More information? Circle Item 7, postcard, last page.

Newly Designed Steam Coil

A newly designed steam coil which maintains uniform surface temperatures over its entire face area regardless of fluctuating load demands is announced by Marlo Coil Co., St. Louis, Mo. Known as the Evntemp, the coil is said to provide uniform leaving air temperatures free of all stratification, with the consistency necessary for precise control in heating systems.

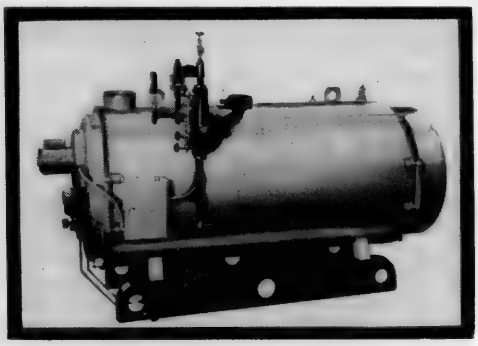
Carefully engineered steam distributing headers and tubes combined with continuous plate-type fins which contact the entire surface of the condensing tubes assure this uniform heat distribution even when operated at 10% of rated capacity. The design also inherently affords maximum possible protection against freeze-ups not heretofore available, the company states.

Tubes in the coils are pitched in the casing for rapid condensate drainage and ease of installation. Each coil has the steam supply connection and condensate connection on the same end, regardless of size, for convenient and economical piping arrangement.

More information? Circle Item 8, postcard, last page.

Processing Plant Boiler

A packaged boiler for light and medium sized processing plants, called the Monitor, is offered by Cleaver-Brooks Co., Milwaukee, Wis. Industrial design standards associated with large boilers are said to be



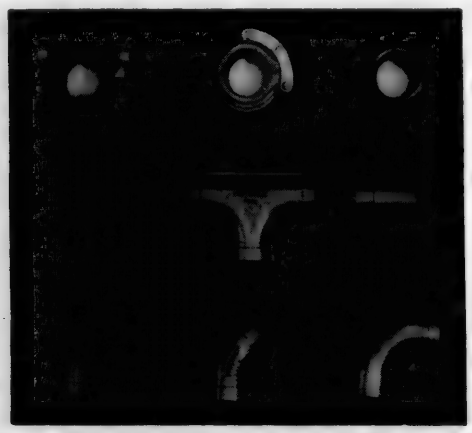
applied in the design of this packaged unit.

Efficiency is guaranteed 80%. There is no need for a chimney, company states, as a simple vent removes any combustion gases from the boiler room. Unit is fully automatic in operation, factory assembled and tested, is available through 60 hp or 2,070 lb steam per hr, and can be fired with oil or gas or can be furnished with a combination burner.

More information? Circle Item 9, postcard, last page.

New Thin-Wall Pipe Coupling

A new and economical method of quick coupling thin-wall steel and aluminum pipe and tubing is announced by Victaulic Company of America, Elizabeth, N. J. Named Vic-Easy, the method is said to provide positive, leak-tight connections through use of quick couplings assembled on specially grooved pipe ends. Leading pipe mills now supply a wide range of wall thicknesses and weights



with these grooves, the company states. There is no loss of metal in the rolling and the pipe or tubing is as sound structurally as when manufactured.

Method is available for pipe and tubing in sizes from 1¼ to 12 inches, and may be used for working pressures up to 1,000 psi, depending on the wall thickness of the tubing and type of coupling used. When the tubing ends are brought into position, a gasket is slipped onto one of the pipe ends. It is then positioned over the joint of the pipes and coupling is fastened over the gasket.

Gaskets are furnished with the couplings. Standard compounds, recommended to 180 deg F, blanket 90% of industrial requirements. Special compounds are available for special services. Joint is flexible, allowing some deflection in any direction without leakage, and coupling mechanically locks the two ends of the tubing or pipe together so that they cannot be pulled out or blown apart. Sections of the tubing or piping can be quickly removed without damage to coupling or pipe ends.

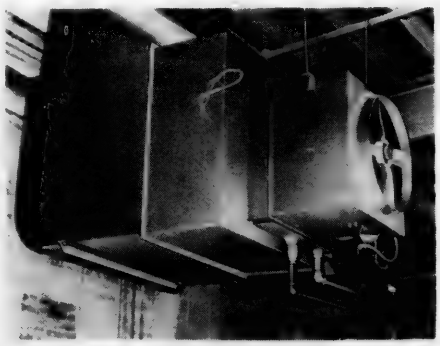
Three types of couplings are offered. Some are illustrated above. One is a snap-joint coupling which is a hinged assembly fastened by leverage and tension. It requires no tools for installation. A second type is a light-weight, economical coupling for use in low pressure, low external stress application. The third, a heavy-duty coupling, is designed for use where high external stress or high internal pressures are expected. These two types can be installed by the use of a single wrench.

More information? Circle Item 10, postcard, last page.

Unit Supplies, Heats Make-Up Air

An air make-up unit is being offered to industry by the Aerovent Fan Company, Inc., Piqua, Ohio. Designed to temper outside air and supply it in sufficient quantities to eliminate negative pressures, this new unit supplements the normal heating system by relieving the infiltration heat load.

Wherever exhaust fans are used, there must be an adequate supply of air to insure proper operation of the exhaust system, or a semi-vacuum is created. Where this



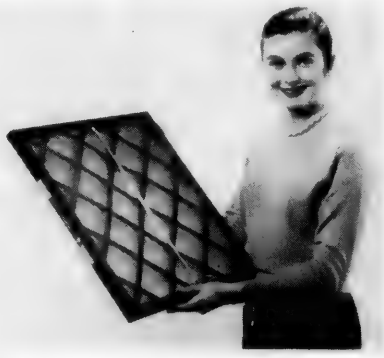
condition exists, it causes excessive filtration around windows and doors, making it difficult to heat the working area properly. The air make-up unit corrects these conditions by replacing exhausted air with clean, fresh, pre-heated air. With the proper balance of supply and exhaust, forced infiltration is eliminated and negative pressures are equalized.

Units are available in seven arrangements, in six sizes from 24 to 54 inches, with air capacities ranging from 4000 to 33,000 cfm. The basic unit consists of a fan and coil assembly with the fan mounted in a plenum on the discharge side of the coil. The advantage of this design is an even distribution of air velocity over the face of the coil, and a uniform discharge air temperature, resulting from the mixing of air in the plenum between the fan and the coil.

More information? Circle Item 11, postcard, last page.

Industrial Air Filter

A fiber glass air filter utilizing die-cut chipboard grille-work rather than metal stampings, is announced by Fiber Glass Div., Pittsburgh Plate Glass Co., Pittsburgh, Pa. To be known as Glasfloss Safety-Grille filter, the new product is said to be particularly desirable for industrial



applications because of its safety advantage. The elimination of metal grille-work in its design prevents hand and wrist cuts from broken metal.

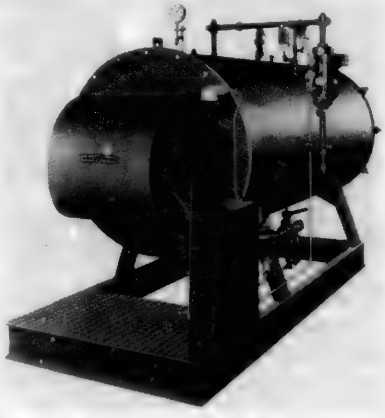
The filter is said to be stronger because it has only two die-cut sections of chipboard (top and bottom) with the ends firmly fastened to make a single compact unit. Construction is of a nature to reduce damage in transit and handling.

Filter is now in production and will be available in all standard sizes for heating, air-conditioning, and ventilating applications.

More information? Circle Item 12, postcard, last page.

Gas-Fired Packaged Boilers

The gas-fired Steam-Pak automatic boiler line, manufactured by York-Shipley, Inc., York, Pa., features a burner head designed for the efficient firing of natural or mixed gas. The new burner insures positive firing and proper mixing of air and gas. Air for combustion is supplied by a blower at the front of boiler which also forces hot gases through the boiler passes.



The improved design reduces the required air pressure. Hence the blower motor is smaller and electricity costs less per boiler horsepower developed. The low-pressure blower also results in more quiet operation.

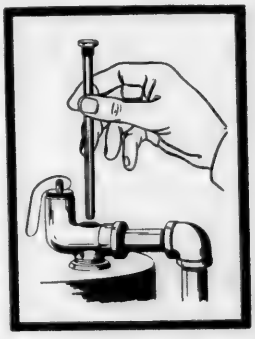
Everything needed—boiler, burner, accessories and controls—is included in the integrated package. Controls have been simplified and are centralized in an enclosed panel on one side of the boiler. The prewired control panel does away with expensive on-the-job wiring.

The line of gas-fired packaged boilers is presently available in 12 sizes ranging from 30 to 125 hp. The line will be extended to 600 hp in the future. Each size may be ordered to supply high-pressure steam, low-pressure steam or hot water.

More information? Circle Item 13, postcard, last page.

Water Heater Relief Valve

Type F-3T pressure-temperature relief valves for water heaters, manufactured by A. W. Cash Valve Mfg. Corp., Decatur, Ill., permit fuse plug replacement without disturbing valve installation.

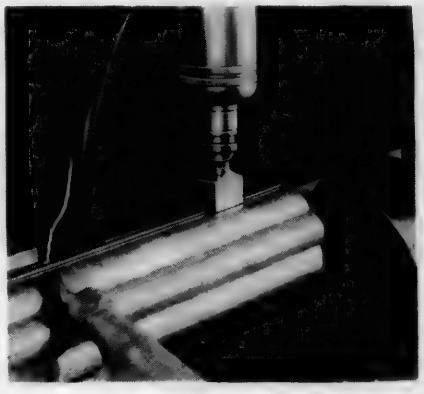


These Cash-Acme valves are available with either short or 6-inch extension plug stems, which are removed simply by unscrewing hex nut on top of the valve directly above the inlet, as shown, in no way affecting the pressure setting. Thus, the company states, fuse plug is correctly placed in the hottest part of the tank's water. Bulletin 2-13, describing the series, is available.

More information? Circle Item 14, postcard, last page.

Lock Seam Sealer

E. V. Nielsen, Inc., Stamford, Conn., announces a recently perfected tool for sealing lock seams in sheet metal. No guide is necessary other than that furnished by a raised step on the tool. Inside and outside lock



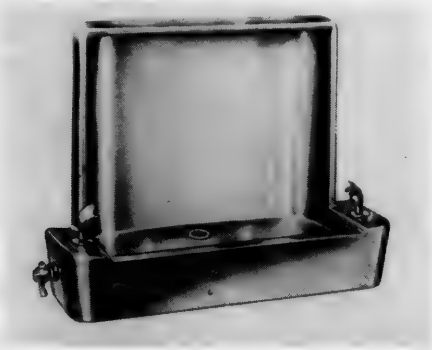
seams are quickly flattened using only the slightly raised edge of the seam to guide on. The Ram-Ex lock seam sealer is designed to close any size lock seam in metal up to 18 gage.

The unit is the most recent addition to more than forty tools designed to be used with the company's Ram-Ex air hammers.

More information? Circle Item 15, postcard, last page.

Double Drinking Fountain

A semi-recessed double drinking fountain, of stainless steel with dual fountain heads and valves, is manufactured by Haws Drinking Faucet Co., Berkeley, Calif.



Model 732 is designed to satisfy drinking water requirements in heavier traffic locations, with the space-economy of semi-recessed installation. Two persons may drink simultaneously. Stainless steel receptor, Type 304, No. 4 finish, provides lifetime sanitation.

More information? Circle Item 16, postcard, last page.

Down-Blow Unit Heater

Addition of Three-Sixty Down-Blo models to its line of gas-fired overhead heating units is announced by Norman Products Co., Columbus, Ohio.

Room air to be heated is drawn in through the top of the unit directly opposite to the air movement in the company's radial-flow models. Units gently distribute a complete circle of warm air downward and outward from the top of the unit. Both types have patented sealed combustion system: all combustion air is drawn from outside the building through a separate inlet pipe while all exhaust gases and products of combustion are vented to the outside under positive pressure within the sealed chamber, company explains.

These unit heaters are recommended for groceries and restaurants where combustion products cannot be allowed to enter the heated space, regardless of down drafts or outside wind velocities, and for drug stores, variety stores, or wherever exhaust fans create a negative pressure. Both radial and down-blow models are available with inputs of 115,000 and 85,000 Btu per hr. Heaters have attractive spun aluminum casings that harmonize with the decor of modern store interiors. They can be suspended flush or non-flush to the ceiling and can be vented either vertically through the roof, or horizontally through the side of the building.

More information? Circle Item 17, postcard, last page.

Switch Guards Isolated Units

An inertia switch, designated 1SA1, an automatic device that is actuated by thrusts, impacts, or excessive vibrations, is developed by Micro Switch, Freeport, Ill., a division of Minneapolis-Honeywell Regulator Company.

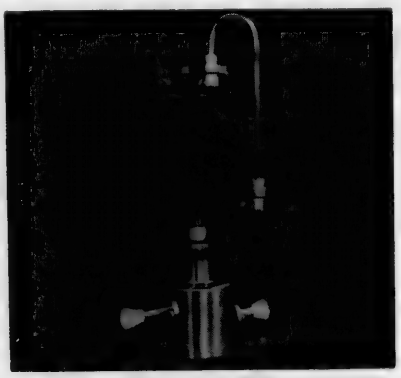
Originally designed for aircraft and missile uses, such as in emergency lighting and fire extinguisher operation, the new switch provides full-time, low-cost protection for unattended industrial equipment. For example, if unusual vibrations occur, the inertia switch senses the troubles, shuts off the machine, or sounds an alarm. In this way, isolated fans, compressors, and other machinery may be continuously protected.

Once actuated, the switch will remain that way and cannot be jarred back into an unactuated position. To reset the switch, a manual reset button is provided. Electrical reset may also be provided. The switch operates when subjected to a thrust in any horizontal direction. A vibration of thrust under the minimum duration of 1/30 of a second will not actuate the switch. Force-of-actuation settings are factory adjusted and may be supplied from 1.5 to 10 or more G's, depending on requirements.

More information? Circle Item 18, postcard, last page.

Corrosion Resistant Valve

Model B-2260 control valve, manufactured by George W. Dahl Co., Inc., Bristol, R. I., is designed to control the flow of a corrosive product.



Body, stuffing box, integral seat, and internal ports are precision machined from a solid block of Teflon, company states, and encased in a stainless steel housing. Plug and stem are one, machined from Teflon and reinforced with stainless steel. Plug is calibrated to meet customer's requirements.

More information? Circle Item 19, postcard, last page.

(Continued on page 100)

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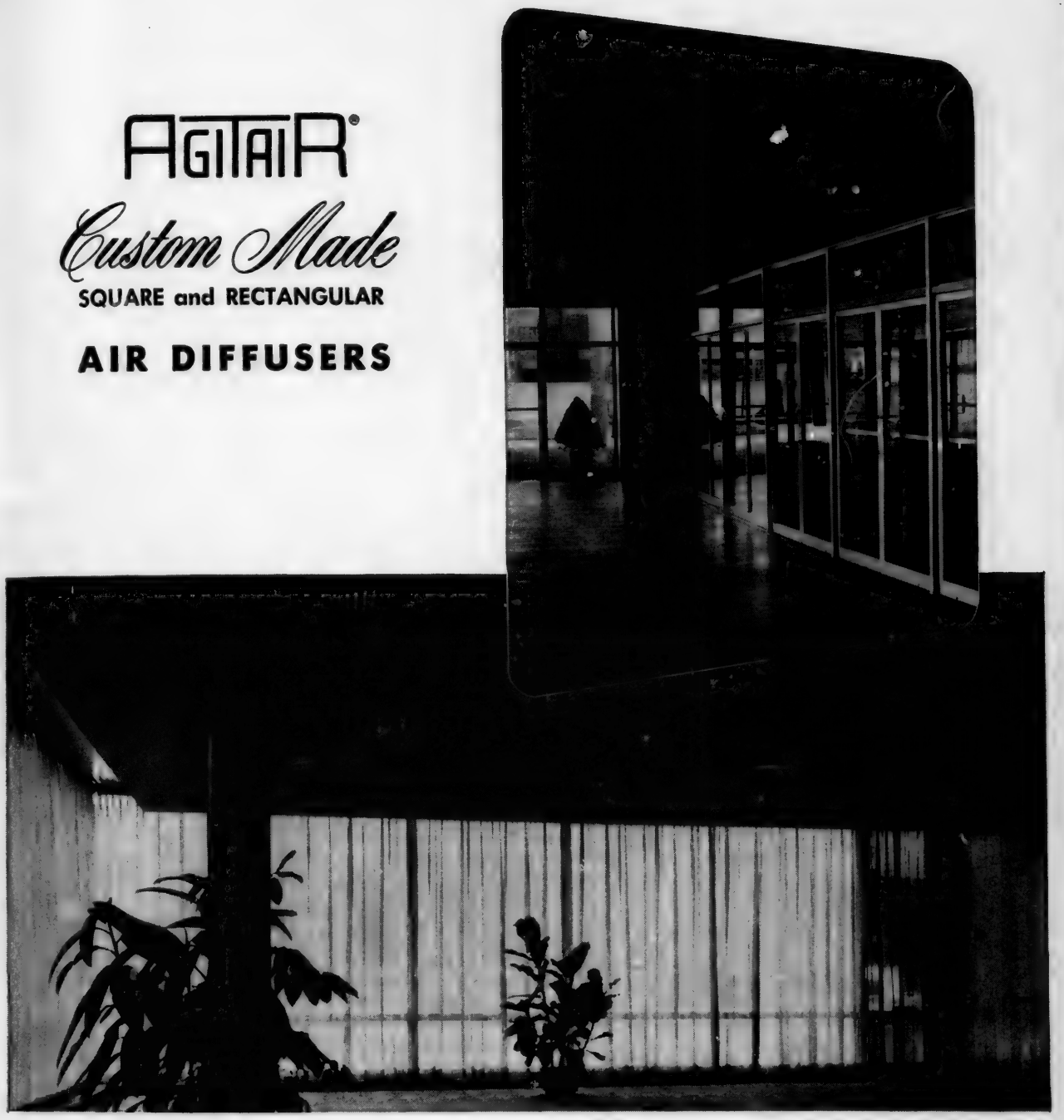

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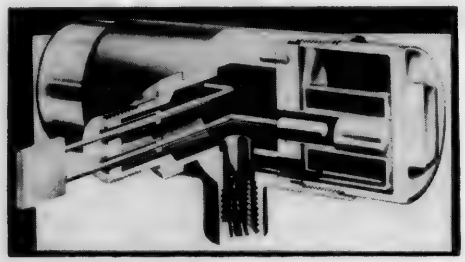
(Continued from page 98)

Controls Liquid, Solid Levels

Model CL-10 Dynatrol level control, manufactured by Automation Products, Inc., Houston, Tex., is recommended for accurate high or low point detection, or narrow range proportional control, of liquid, solid or slurry levels.



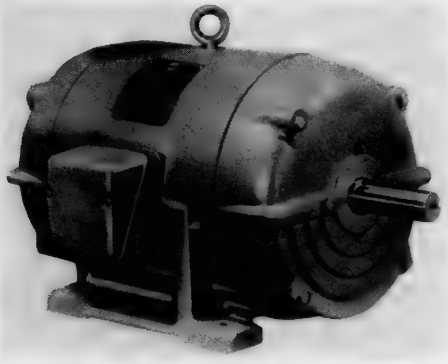
Control has a positive acting electrical output control signal that varies with the amount of immersion of the 120-cycle-per-sec vibrating paddle in the medium being detected. The output signal can be used to control the operation of any type of electrical equipment. Unit is rated for 3000 psig; is explosion proof at 115 volts a-c.

More information? Circle Item 20, postcard, last page.

Synchronous Induction Motor

Production of a synchronous induction motor, said to be the first of its type, in the same NEMA frame size as a standard motor of equal horsepower, is announced by Louis Allis Co., Milwaukee, Wis.

Called the Syncro-Spede, this motor accelerates as an induction motor but runs at exact synchronous speed



without permanent magnets or d-c excitation involving collector rings and brushes, wound rotating fields, etc. It is the most compact a-c motor available for synchronous applications and offers the highest power factor and efficiency, the company states. It is suitable for use on many applications requiring constant speed with varying load. Motor can be used for constant speed drives in such industries as machine tool, synthetic fiber, plastic, paper, wire-drawing, glass making, and printing. Because of its size it can provide precise frequency systems in small generator ratings.

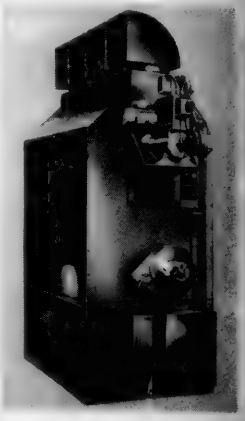
As a conveyor drive, the motor makes it possible to have an exact constant-speed or adjustable-speed system from no-load to full-load conditions with a minimum of driving units and controls. Since this motor is unaffected by voltage fluctuations, it is also well suited for precision timing and metering devices and for recording instruments as well.

Manufactured in ratings from 1 to 100 hp in any enclosure type, foot- or flange-mounted, motor is designed for horizontal or vertical mounting with a wide range of mechanical modifications available to meet specific application requirements.

More information? Circle Item 21, postcard, last page.

Industrial Heater Line

Four-pass counterflow heat transfer is featured in a new line of industrial heaters developed by Industrial Heater Div., Lennox Industries Inc., Des Moines, Iowa. The transfer is accomplished without the use of internal baffles. Company engineers report that with a minimum of maintenance, 80% or better efficiency is effected through the transfer.



Primary heat transfer surface is constructed of heat-resistant stainless steel, eliminating the refractory lining and its periodic replacement. This permits the unit to be mounted on the floor or suspended from the ceiling.

Blower section is equipped with large blowers operating at relatively low shaft speed, delivering high cfm capacities with nominal horsepower requirements. The blower compartment may be shipped as part of the heat exchanger section or as a separate item for remote mounting, the company states.

The line of industrial heaters is available in eight sizes, ranging from 400,000 to 2,000,000 Btu per hr output, and is suitable for use with oil, gas, or combination fuels.

More information? Circle Item 22, postcard, last page.

Oil Pump and Control

An oil pump and tank control unit, said to be able to raise fuel oil to any height for use in overhead heaters, is called N-E Hite Pump and Tank-N-Kontrol, and is made by N. E. Hite Mfg. Co., Chicago, Ill.

Operation of the unit is governed automatically by two heavy-duty mercury switches which control two sets of floats. The main set of floats maintains the level of oil in the feed tank and stops the pump if the oil feed line is broken or if the tank runs dry. The other set of floats stops the pump in case the main set fails to cut it off at high level.

Since no return line is required from the pump to the oil storage tank (the pump is self-priming) and no overflow line is necessary from the feed tank, installation time and costs are reduced, the company states.

More information? Circle Item 23, postcard, last page.

(Continued on page 102)

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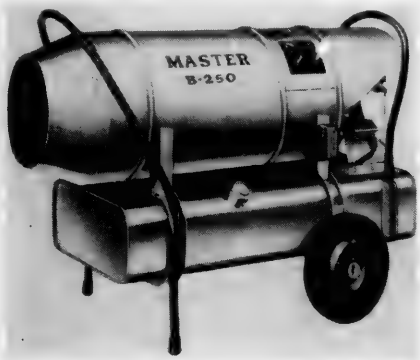
RICHMOND ENGINEERING CO., INC.

(Continued from page 100)

Portable Heater

A portable heater that delivers 250,000 Btu per hr is added to the line of Master Vibrator Co., Dayton, Ohio. Model B-250 is recommended for contractors who need heat to keep construction work moving during the cold months.

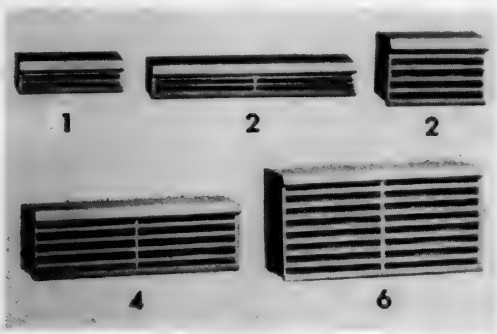


Heater runs for 16 hr on a tank of kerosene or fuel oil, and will not oil up plastered or painted surfaces, company states. Thermostatically controlled, unit plugs into any 115-volt a-c outlet. Unit does not need a vent.
More information? Circle Item 24, postcard, last page.

Modular Brick Size Vents

C-S modular brick size vents in cast aluminum, designed for neat, simple storm-proof venting of confined spaces and suited for air conditioning intakes are supplied in an expanded line by Construction Specialties, Inc., Cranford, N. J.

Seven brick vent sizes readil, and economically answer all construction requirements. These include five sizes

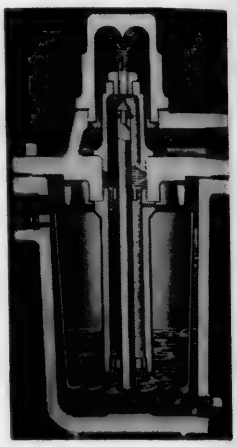


with dimensions corresponding to those of standard brick. Numbers in illustration refer to equivalent standard brick sizes. The six-brick size may be used as a modular unit in cinder block as well as brick construction. Two jumbo brick size vents are also supplied. Vent bricks may be nested together where multiple units are desired. Clad aluminum wire screen is pre-formed to fit snugly and neatly.

Attractively designed with clean-cut louvered faces, the brick size vents provide particular neatness since their installation does conform to the pattern of brick coursing. Their modular design also allows installation with a minimum of labor. In addition, castings of aluminum offer long range economy. They will not rust nor will they stain adjacent building structure. No painting or retouching is necessary. Lower freight costs and more economical job handling are also enjoyed because of lighter weight.
More information? Circle Item 25, postcard, last page.

Trap Valve Rotates

An impeller-driven rotating valve is offered on steam traps manufactured by H. O. Trerice Co., Detroit, Mich.



Valve assembly comprises bucket, valve, and impeller, operating as an integral unit, and is the only moving part in the trap. Impeller, changing seating position of the valve at every discharge, is said to prevent uneven wear of valve and orifice, wire-drawing, and steam leakage. Impeller action also keeps sediment agitated so that it passes out with each discharge of condensate. Preventive maintenance is made possible by a convenient removable cap, permitting inspection of valve and seat without disturbing high-pressure bolts or gasket. A 4-page bulletin, containing engineering data, valve and orifice charts, is available.
More information? Circle Item 26, postcard, last page.

New Type Transmission Belt

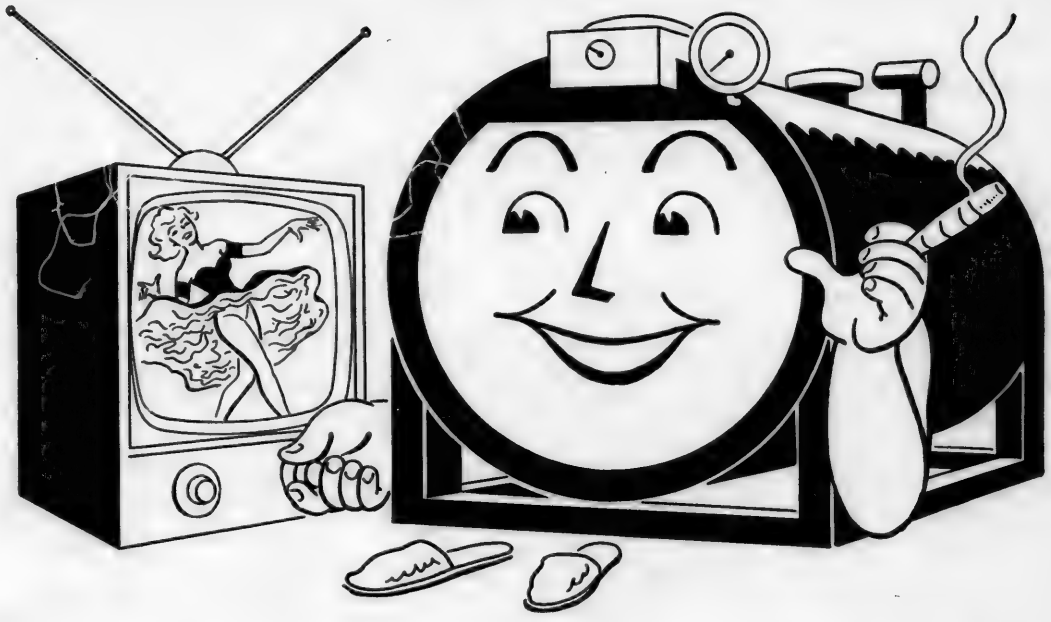
A new type of transmission belt introduced about 18 months ago to America from the Continent where, it is said, it now drives 60% of the large, belt-driven equipment there, is called Extremultus. It is offered by Extremultus, Inc., New York, N. Y.

The belt is a combination of two materials, a special type of polymer and a chrome tanned leather. The polymer is the tensile member and the chrome tanned leather is the friction surface.

The polymer has a tensile strength of 28,500 lb per sq in. Its modulus of elasticity is 78,230 lb per sq in. The chrome tanned leather carries none of the load; its only function is as a friction surface. Because of these characteristics, these belts, in all installations, are significantly thinner and narrower than the belts they replace, it is said.

According to the manufacturer, the principal features of the new belt are as follows: It will not slip or stretch. It will operate at speeds up to 24,000 fpm and horsepowers up to 6,000. It will deliver smooth constant speed at low tensions and at relatively slow speeds. It will operate at ratios up to 20:1 and arcs of contact as low as 90 degrees.
More information? Circle Item 27, postcard, last page.

(Continued on page 104)



"Easy Living" with a Continental

Simplicity is the feature of the Continental Automatic Boiler.

Easy to install – a Continental Automatic Boiler is a completely integrated unit from one dependable source – not a collection of unrelated component parts expensively man-houred together.

Easy to specify—you can safely specify the minimum-sized boiler that will satisfy your requirements—Continental Automatic Boilers are guaranteed for more than 80% rated efficiency.

Simplicity of design – practical, two-pass design gives uniform flow of combustion gases through all return tubes. It's Continental's "Spinning Gas" technique where return tubes do equal work at equal temperatures – result, longer boiler life at more efficient, low-cost operation.

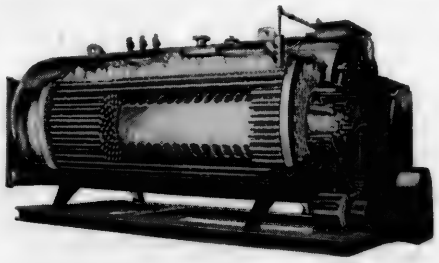
Easy to maintain – no baffles, no partitions—no take-out, put-back refractories. Hinged doors at front, back, and on the burner, make quick work of inspection and routine servicing.

Boiler-guessing stops when you order fire-tested Continental Automatic Boilers—for more details, write for Bulletin BE-3.

BOILER ENGINEERING & SUPPLY COMPANY, INC.

7 Manavon Street, Phoenixville, Pa.

The **Continental** AUTOMATIC BOILER



Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

(Continued from page 102)

Gas-Fired Water Heater

A direct gas-fired, high recovery water heater line, Series DG, has been introduced by Portmar Boiler Co., Inc., Brooklyn, N. Y. Claimed to deliver large volumes of rust-free automatic hot water in residential, commercial and industrial installations, the gas-fired units are compact and flush-jacketed to fit into small spaces.

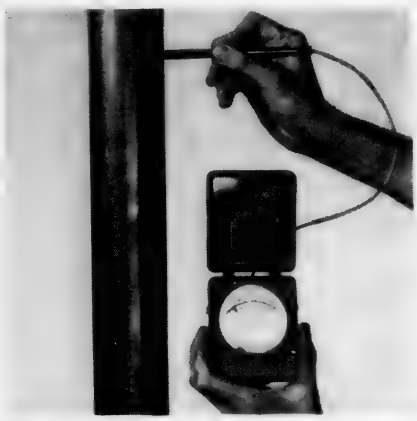
The water heater is ASME stamped and constructed of heavy gage steel, completely galvanized inside and out to prevent pitting and corrosion. The multiple flue plus 19 sq ft of heating surface promote the high recovery in this heater. Gun-type gas burner is flange-mounted for easy assembly and is said to comply with all safety and operational requirements. Burner parts are brass, stainless steel or plated to prevent corrosion.

Model DG-125 has a gas input of 140,000 Btu per hr and an output of 125 gph at 100 deg rise. A large storage tank, with capacities up to three times the hourly rating of the DG-125 water heater, may be added for increased hot water supply.

More information? Circle Item 28, postcard, last page.

Pyro-couple in 2 Styles

Featuring a specially developed sensing probe, a new model pyro-couple is available from Royco Instruments, Albany, Calif., in two basic styles. These are the remote-probe type (illustrated) having the probe mounted on the end of a 30-inch flexible cable, and a type having the probe mounted integrally on the rear surface of the indicating instrument.



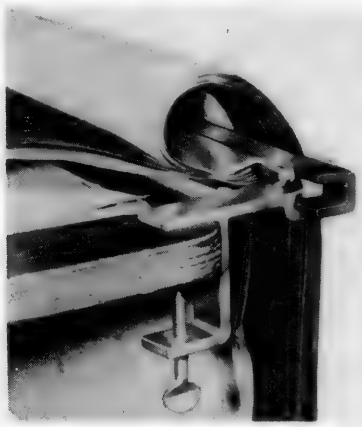
Recommended primarily for use on reasonably clean metal or other surfaces, the probe has its sensing element spring loaded between two projecting lips. This arrangement insures that from one reading to another the sensitive element is applied with constant pressure which eliminates possible variability of readings obtainable by variable pressures.

Accuracies of 5% on all ranges are achieved. Scales, which are calibrated in both Fahrenheit and Centigrade, are available with four ranges: 0 to 300, 0 to 450, 0 to 650, and 0 to 1000 deg F for the remote-probe style.

More information? Circle Item 29, postcard, last page.

Drawings Clamp to Table

Aluminum table clamps, as illustrated, are designed to hold a fully-loaded Plan Hold drawings holder in place while leafing through sheets, announces the manufacturer, Plan Hold Corp., South Gate, Calif.



No tools or fasteners of any kind are required to place or remove holder from its secure position within the clamps, company states. A 16-page catalog on vertical filing equipment is offered.

More information? Circle Item 30, postcard, last page.

Return-Air Silencer

A silencer, developed and designed to prevent the transmission of noise through return air vents without impeding the passage of air, is introduced by Air Conditioning Dept., Industrial Acoustics Co., Inc., New York, N. Y.

Called Quiet-Vent, silencing unit has functional construction designed to fit snugly inside normal walls, providing a neat, inconspicuous appearance. Its one-piece design facilitates handling and installation.

Silencers are available in many sizes to suit individual requirements and applications. Constructed of 22- and 24-gage steel, silencers are said to accomplish an attenuation of 40 decibels or more. Units are also available in a hang-on type for economical installation. A brochure describing both types is available.

More information? Circle Item 31, postcard, last page.

(Continued on page 106)

THE MARK OF QUALITY

BARBER COLMAN

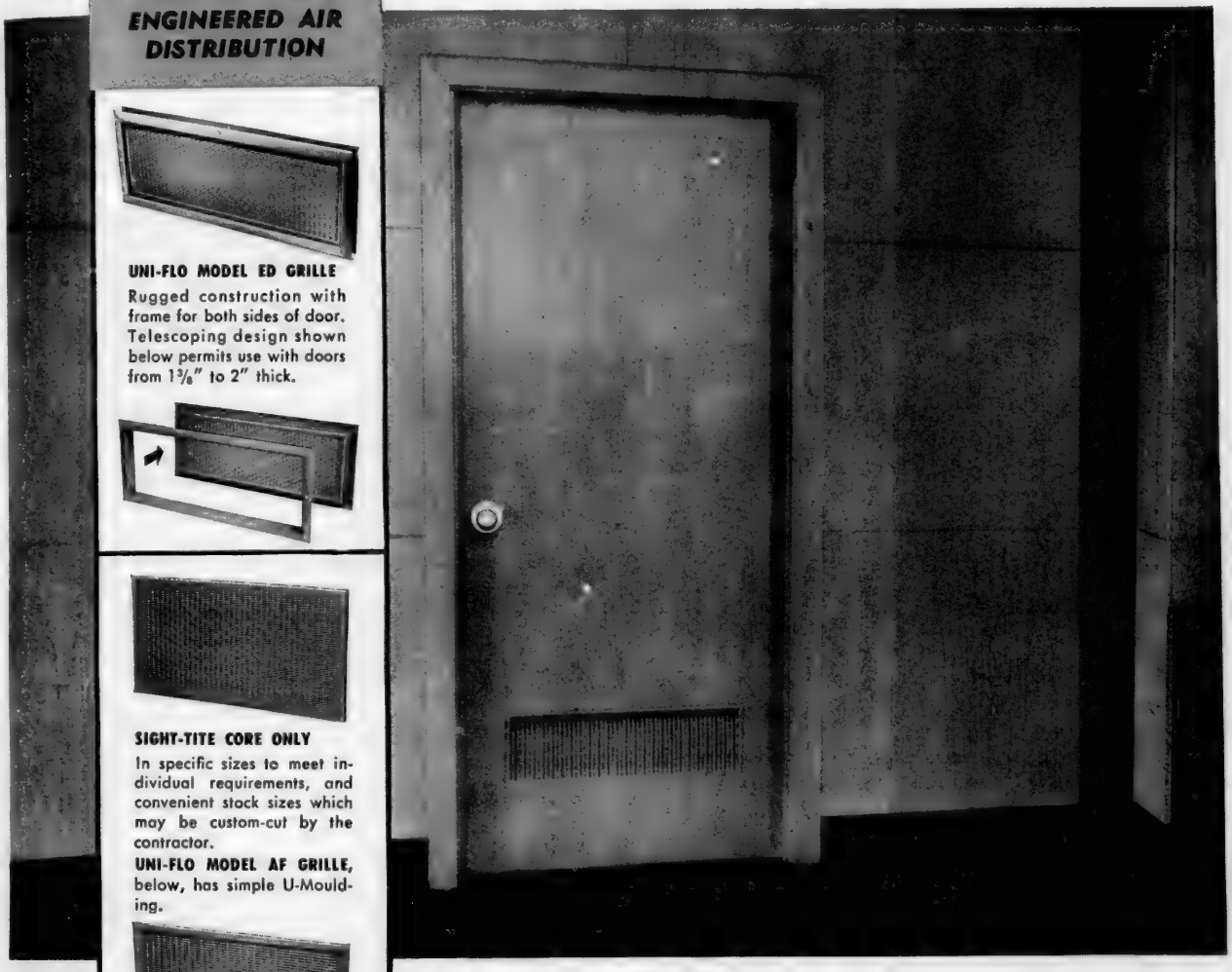
Uni-Flo

ENGINEERED AIR DISTRIBUTION

visionproof, inconspicuous

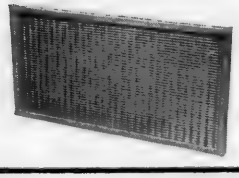
Sight-Tite Door Grilles

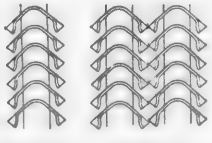
to complement contemporary interiors



UNI-FLO MODEL ED GRILLE
Rugged construction with frame for both sides of door. Telescoping design shown below permits use with doors from 1⅜" to 2" thick.

SIGHT-TITE CORE ONLY
In specific sizes to meet individual requirements, and convenient stock sizes which may be custom-cut by the contractor.
UNI-FLO MODEL AF GRILLE, below, has simple U-Moulding.





Sight-Tite Light-Tite

Core cross section at left shows Uni-Flo Sight-Tite Grille. Cross section at right shows Light-Tite installation for photographic darkrooms and laboratories.

Handsome and strong Uni-Flo Sight-Tite Door Grilles provide free air movement for offices, dressing rooms, locker rooms, school rooms, and other areas, without unsightly "see-through" gaps. Because of their inherent extra strength, Uni-Flo Sight-Tite Door Grilles withstand scuffing and kicking. Rattleproof construction also contributes to a finer installation. Available with six standard baked enamel and electroplated finishes, or special baked enamel finishes to match any color. With frame, or as core alone, in wide range of sizes to meet your job requirements. See your nearest Barber-Colman Field Office, or write for catalog.

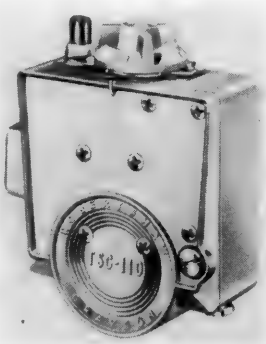
BARBER-COLMAN COMPANY

Dept. X, 1102 Rock Street, Rockford, Illinois

(Continued from page 104)

Gas Flow Control

A manually-operated gas flow control for space heaters, the TSC-110, is announced by Grayson Control Div., Robertshaw - Fulton Controls Co., Long Beach, Calif.



Incorporated in the manual control is an automatic pilot safety device which completely shuts off flow of gas to both main burner and pilot light in case of pilot outage.

The control knob on the unit has a metal stop which prevents accidental shut off of pilot during normal operation of the space heater.

Designed for low capacity gas-fired space heaters, the control is available with or without a built-in dust and gum filter. Manifold piping is standardized to reduce inventory expense.

More information? Circle Item 32, postcard, last page.

Burst-Proof Steam Hose

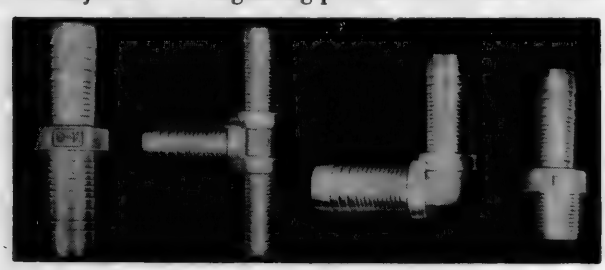
A line of wire-braid reinforced, burst-proof hose for saturated steam service at pressures to 200 psi, or for superheated steam to 385 deg F, is available from Acme Rubber Mfg. Co. Div., Acme-Hamilton Mfg. Corp., Trenton, N. J. Standard sizes include ½, ¾, 1, 1¼, 1½, 2 and 2½-inch ID. It is recommended for high pressure steam service, auxiliary fire fighting, for syphoning or drilling machines, flexible steam connection of two lines or for supplemental steam supply, as well as for flue and still cleaning. Made of heat-resistant rubber and Neoprene.

More information? Circle Item 33, postcard, last page.

Fittings for Plastic Pipe

Dur-X Nylon fittings, precision made for use with plastic pipe, are developed by Franklin Plastics, Inc., Franklin, Pa.

Made of Nylon resin, these fittings will not corrode or rust, company states. During manufacturing they are subjected to a toughening process which enables them



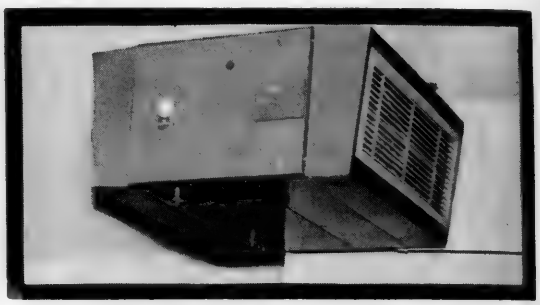
to withstand impact blows as high as 75 ft-lb. Deep, accurate, standard IPS threads and a hexagon hub provides a gripping surface for ordinary wrenches. Smooth inner bore speeds liquid flow and miniature serrations on areas beneath the clamp assure bite inside the pipe, minimizing any chance of leaks. Sizes run from ½ through 2 inches and include insert *X* male thread adapter, insert coupling, insert elbow, and insert tee.

More information? Circle Item 34, postcard, last page.

Commercial Air Handler

A compact air handling unit for commercial installation is announced by Home Products Div., Rheem Mfg. Co., Chicago, Ill. Weighing 150 lb, it can be installed by two men, even when it is to be ceiling mounted, company states.

Housing has been styled to blend into a variety of



color schemes and ceiling textures. Intake and outlet grilles, for instance, are painted in contrasting color for decorative accent. Models deliver 40,000 and 57,000 Btu per hr of cooling and are designed for use with company's standard condensing units. Air handler encloses twin blowers, each with its own motor.

Access panel for service is shown underneath unit in ceiling mounted unit. The same unit is inverted in attic installations, so that panel is on top. Cooling coils will drain properly in both positions.

More information? Circle Item 35, postcard, last page.

Vertical General Service Pump

A newly designed Type SDV general service pump that is installed vertically instead of horizontally to save floor space, and which is completely protected against dirt and water is announced by Economy Pump Division of C. H. Wheeler Mfg. Co., Philadelphia, Pa.

These pumps are available in sizes from 1 to 3 inches with capacities ranging from 10 to 400 gpm at heads of 15 to 250 ft. They are designed for brine and hot and cold water circulation, air conditioning and sprinkler systems, boiler feeding, pressure boosting, and washing machinery.

The motor on each pump is carried high above floor level and is unaffected by water or dirt. Pump rotors can be easily removed without disturbing suction or discharge connections. The rotor assembly is carried on combination thrust and radial ball bearings and encased in a dust-tight housing. The lower sleeve bearing prevents radial misalignment. The motor stand is registered to insure proper alignment of pump and motor.

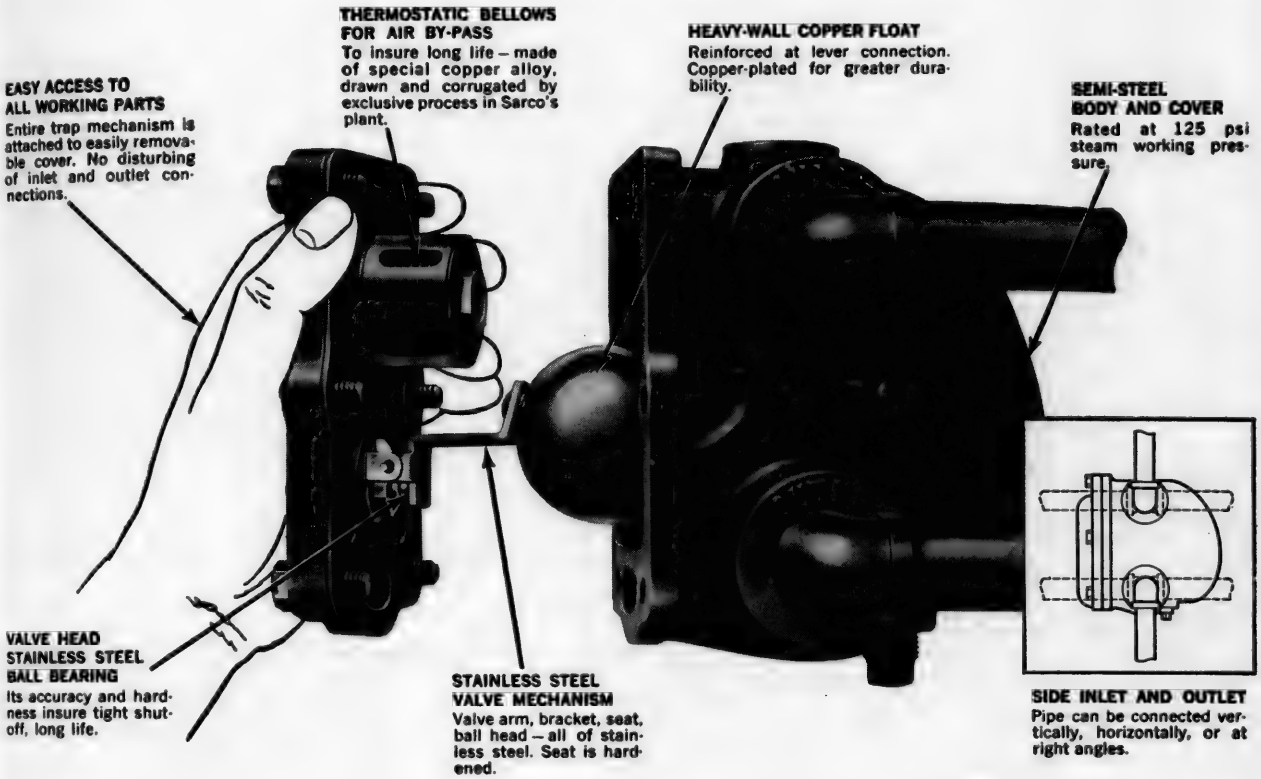
More information? Circle Item 36, postcard, last page.

(Continued on page 108)

Now...more trapping value for your money!

NEW SARCO FLOAT-THERMOSTATIC STEAM TRAP

with improved engineering features


THERMOSTATIC BELLOWS FOR AIR BY-PASS
To insure long life – made of special copper alloy, drawn and corrugated by exclusive process in Sarco's plant.
HEAVY-WALL COPPER FLOAT
Reinforced at lever connection. Copper-plated for greater durability.
EASY ACCESS TO ALL WORKING PARTS
Entire trap mechanism is attached to easily removable cover. No disturbing of inlet and outlet connections.
SEMI-STEEL BODY AND COVER
Rated at 125 psi steam working pressure.
VALVE HEAD STAINLESS STEEL BALL BEARING
Its accuracy and hardness insure tight shut-off, long life.
STAINLESS STEEL VALVE MECHANISM
Valve arm, bracket, seat, ball head – all of stainless steel. Seat is hardened.
SIDE INLET AND OUTLET
Pipe can be connected vertically, horizontally, or at right angles.

This new, improved Sarco Float-Thermostatic Steam Trap Type FT discharges condensate at steam temperature continuously and without shock.

Recommended to drip steam mains, unit heaters, blast coils, heat exchangers, and other allied process equipment, requiring accurate temperature control.

Air Binding Impossible – equipped with separate thermostatic air vent, which removes automatically and immediately all air and incondensable gases reaching trap. Balanced pressure vent self-adjusts to all operating pressures. Its location above condensate level permits discharge of air and gases reaching trap after start-up. Does not require adjustment when pressures change.

Sizes – ¾ and 1"
For steam pressures – 0 to 125 psi

Write for Bulletin 455-B to Sarco Company Inc., 635 Madison Avenue, New York 22, N.Y.

22108

SARCO

REMEMBER— only Sarco makes all types

Thermostatic Steam Traps

Liquid Expansion Steam Traps

Thermo-Dynamic Steam Traps

Float Thermostatic Steam Traps

Camlift Bucket Steam Traps

(Continued from page 106)

Blow-Pipe Elbows

A new production technique in fabrication of its line of blow-pipe elbows said to assure a tolerance of not more than 1/16 inch referring to radius, and in roundness, and degree of angle, is announced by Wer-Coy Fabrication Co., Detroit, Mich.

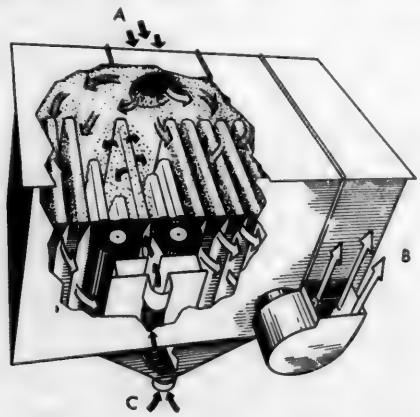
Elbows are 5 and 7-piece, air-tight, arc-welded construction available in 14, 16, and 18-gage black iron and galvanized, with sizes from 3 to 20 inches. All standard angles from 15 to 90 deg. A wide variety of throat radii, from 2 inches to 1½ times diameter of pipe—available at no additional cost.

More information? Circle Item 37, postcard, last page.

Dust Filter Improved

An improved version of its Roll-Clean Dynaclone dust filter, providing more efficient dust collection from the filter bags, is offered by the W. W. Sly Mfg. Co., Cleveland, Ohio.

The roller cleaner moves back and forth across the open ends of the filter bags, sealing each bag as it is being cleaned by atmospheric air. This cleaning air



is brought into the filter by the main operating fan while the dust filter continues to operate. Cutaway illustration shows (A) dust entry into unit, passage of dust-laden air through filter bags, (B) clean air exit to the single fan, and (C) hose through which reverse cleaning air is admitted to the roller cleaner. This design provides greater cloth area, hence, greater cleaning capacity. Any single bag may be removed without disturbing the other bags. Also, a complete dust seal is provided by the rubber rolls which block off the adjacent bags to prevent pick-up of dust dislodged from the bag being cleaned.

More information? Circle Item 38, postcard, last page.

Electric Tube Cleaner

An electric tube cleaner called Rotojet, developed in the Roto plant, Elliott Co., Newark, N. J., for tubular equipment in hospitals, hotels, public buildings, apartments, and industrial plants where noise of conventional air-driven tube cleaners is objectionable, or where compressed air or water at high pressure is unavailable, cleans scale, mud, carbon, and other deposits from straight tubes from 25/32 to 4 inches ID, in water and fire tube boilers, evaporators, condensers, and heat exchangers.

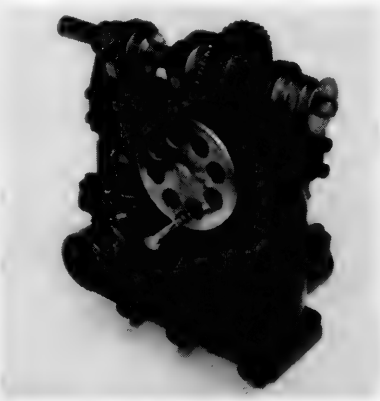
Unit consists of a stand-mounted motor, flexible shafting, electric cable, and a selection of cutter heads, brushes, drills, and scrapers to meet specific cleaning requirements. Motor is mounted in a yoke to permit vertical and horizontal movement so that tubes on top, sides, and bottom can be cleaned without moving the stand.

Bulletin 107E, giving full details, is offered by the company, a division of Carrier Corporation.

More information? Circle Item 39, postcard, last page.

Purge Sequence Valve

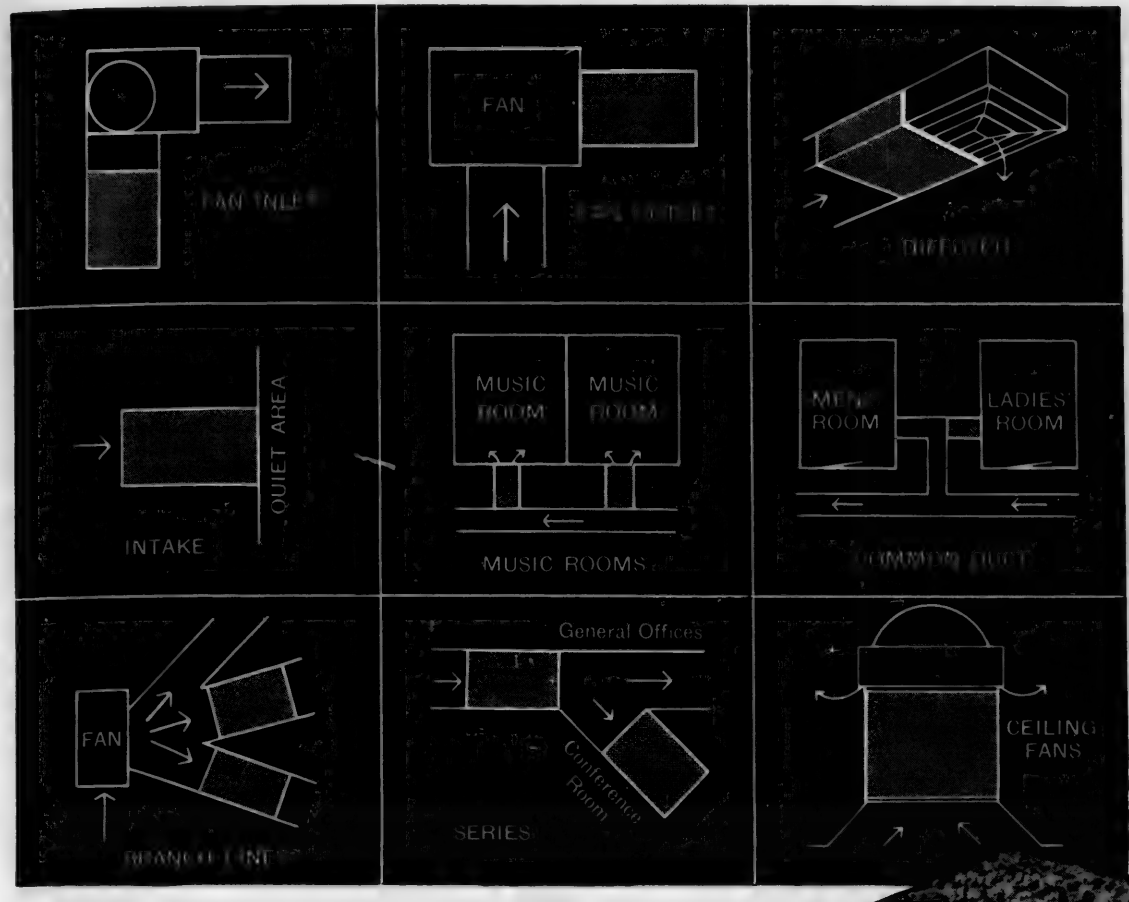
Announcement has been made of a purge sequence valve by Atlas Valve Co., Newark, N. J., which is said to provide a secure and hazard-free means of steam purging or scouring oil burner tips in industrial installations.



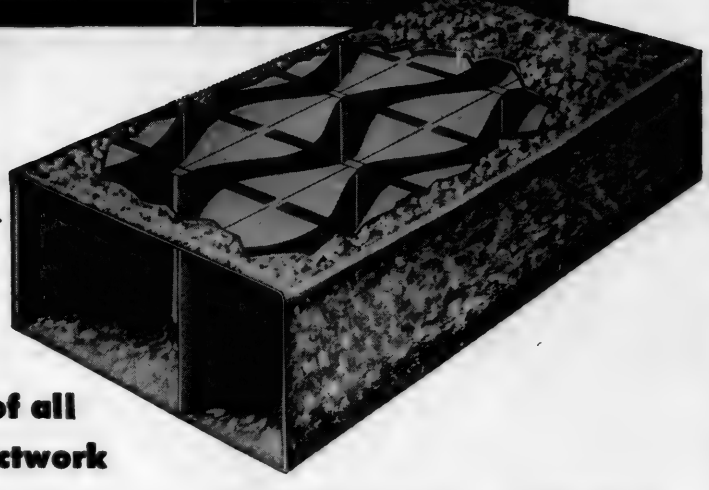
Designated Fig. 1000, the device is a triple interlocked valve system actuated by a single handwheel. It dictates an inflexible and irreversible sequence in the control of (1) atomizing steam, (2) fuel oil, and (3) steam for purging the burner tips. The cycle positively prevents the admission of oil to a hot firebox before the admission of atomizing steam, eliminating possible human error and possible boiler explosion in the manipulation of three separate valves usually required in this type of installation.

More information? Circle Item 40, postcard, last page.

(Continued on page 110)



Every Building Needs Aircoustat® Sound Traps



AIRCOUSTAT silences all noise of all frequencies traveling through ductwork

Eliminate disturbance, distraction and irritation caused by noises escaping from one area to another through ductwork.

Install AIRCOUSTAT Sound Traps. AIRCOUSTAT eliminates guesswork, wasted space and unnecessary expense of duct lining. You can guarantee your client trouble-free performance. You can estimate with complete confidence the performance of particular applications. If AIRCOUSTAT fits geometrically, it fits acoustically.

AIRCOUSTAT saves you space. Its greater effectiveness permits smaller-sized ducting It eliminates bulky mufflers.

For more details, write to KOPPERS COMPANY, INC., Industrial Sound Control Dept., 6312 Scott Street, Baltimore 3, Md.

KOPPERS

INDUSTRIAL SOUND CONTROL

Engineered Products Sold with *Service*

(Continued from page 108)

Drafting Tables

Two additions to its line of Anco-Bilt drafting tables are announced by Anco Wood Specialties, Inc., Glendale, N. Y.

Table base sizes have been standardized. The same

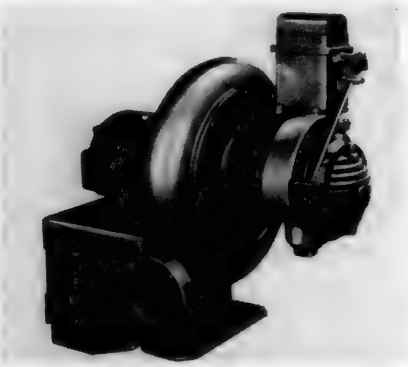
base size will be used for all tables and interchangeable boards of varying dimensions will be available. Thus, when the need for a larger (or smaller) board arises, only the top need be replaced, instead of the whole table.

Features of both the wooden and steel (shown) tables include effortless fingertip lever adjustment of working angle of board to vertical, a print drawer the full width of the base, large reference top; use of plated corrosion-resistant hardware; metal edges on boards which are select clear lumber sanded satin smooth and finished with two coats of semi-gloss lacquer. A full length guard rail is provided.

More information? Circle Item 41, postcard, last page.

Air-Gas Pre-mixer

Series 20 Unimix machines, which provide a single, centralized control of combustion characteristics wherever premixed air-gas mixtures are needed, are announced by Combustion Div., Eclipse Fuel Engineering Co., Rockford, Ill.



Units, in 8 basic capacities, are available for either manual or automatic operation, and are adaptable to a broad range of heating applications on furnaces, boilers, ovens, air heaters, washers, and dryers. Principle of operation: Up to 9 gas orifices in the manifold are uncovered, one at a time, mechanically responding to the air valve as it moves from closed to open position. Individual orifice openings are adjusted manually according to the type of mixture desired.

Machines operate by air and gas being drawn in by the blower. Volume of air to the blower is directly controlled by either manual or automatic (illustrated) opening and closing of the segment-shaped air valve provided in the Variport mixer. Gas under regulated 2-16 inches water column pressure is admitted to mixer in the manifold chamber at the top of casting.

More information? Circle Item 42, postcard, last page.

Hospital Control System

An electronic control system, called Hospital Master, that enables a surgeon to remotely regulate temperatures in the operating room during surgery has been developed by Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.

Without taking his eyes from the patient, the physician steps on a foot pedal beneath the surgery table which rings a bell on a telephone located on a control panel at the remotely-located survisory nurse's desk. His voice is picked up by a sensitive microphone located in the ceiling as he requests a temperature change. From her desk, the nurse can instantly obtain the temperature in the operating room by pushing a button on a control panel and reading an indicator in front of her. She is able to reset the temperature to conform with the doctor's wishes immediately by turning a calibrated knob. The system gives a supervisory nurse complete control over heating and air conditioning in all critical areas.

More information? Circle Item 43, postcard, last page.

Flexible Duct Connections

Two flexible duct connections are added to the Flexi-Duct line manufactured by Grant Wilson, Inc., Chicago, Ill. Type C-6 and Type C-10, for use on the cool side of heating and air-conditioning systems, are made of heavy, woven, canvas fabric.

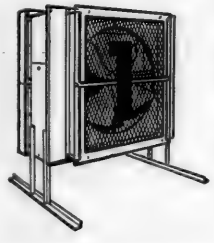
Used on blower, furnace, and plenum joints, on take-offs, and main or branch duct systems, company states, these flexible tape connections prevent duct or pipe from becoming noise conductors. Tape is available in 6 and 10-inch widths, 100 ft to the roll.

More information? Circle Item 44, postcard, last page.

(Continued on page 112)

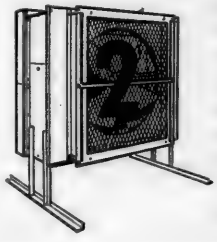
ONLY KRAMER UNICON + WINTERSTAT* GUARANTEES ALL 4

MAXIMUM LIQUID PRESSURE AT EXPANSION VALVE IN WINTERTIME



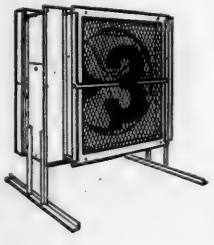
Only the Kramer UNICON plus WINTERSTAT guarantees the full refrigerant pressure *at the expansion valve* for full cooling capacity — even at below 0°F outdoors — *automatically!*

MAXIMUM SUMMER CAPACITY WITH PATENTED WINTERSTAT



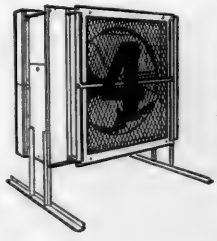
Only Kramer UNICON plus WINTERSTAT guarantees maximum condensing capacity in summer. In hot weather, the patented WINTERSTAT is out of the refrigerant circuit, permitting normal drainage from the condenser without restriction. This assures maximum condensing capacity in summer — *automatically!*

PROMPT DEFROSTING AT ANY OUTDOOR TEMPERATURE



The use of UNICON plus WINTERSTAT makes Kramer THERMOBANK the only low temperature system that can guarantee operation and complete defrosting at any outdoor temperature—even 0°F or lower — *automatically!*

IMMEDIATE COMPRESSOR START-UP REGARDLESS OF OUTDOOR WINTER TEMPERATURE



Only Kramer UNICON plus WINTERSTAT (using modification #1) ensures positive and immediate compressor start-up with pressurestat operating the system, regardless of outdoor winter temperatures at the UNICON and regardless of length of compressor lay-off — *automatically!*

**UNICON is a remote type air-cooled condenser WINTERSTAT is a year 'round automatic head pressure control*

WRITE FOR BULLETIN U-210-L

KRAMER TRENTON CO. • Trenton 5, N.J.

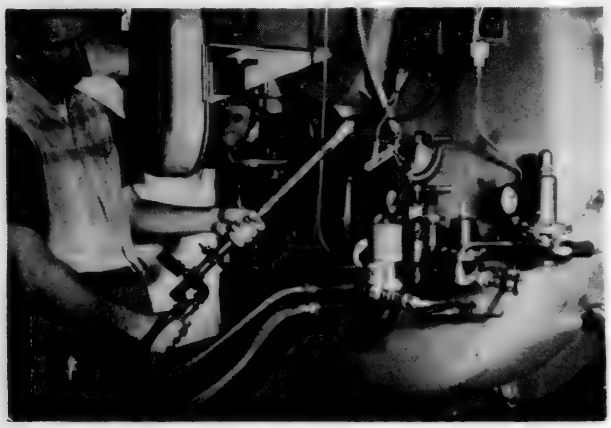
44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

(Continued from page 110)

Simplified Nozzle Cleaning

Incorporated in its line of CB boilers by Cleaver-Brooks Co., Milwaukee, Wis., is a single-tip retractable nozzle that simplifies cleaning of the burner nozzle.

Two settings on the retractable nozzle are for oil and for gas respectively. In forward position the nozzle is put into firing position for oil. In this position a plate presses a switch in series with limit controls. The burner cannot start until this switch is in position.

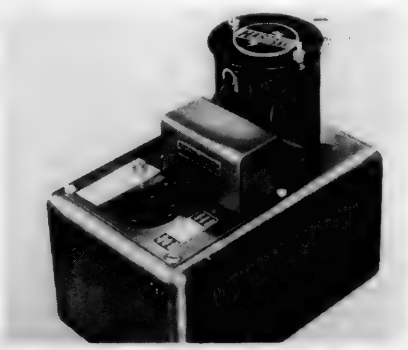


To switch from oil to gas firing, the assembly is drawn out to second notch about five inches from forward position. This keeps nozzle out of hot firing zone, prevents vaporization of oil still within nozzle. Photo shows nozzle withdrawn. Flexible lines allow nozzle to be withdrawn for inspection without removing bolts. A small vise conveniently located on boiler head is used to remove nozzle tip quickly.

More information? Circle Item 45, postcard, last page.

Aluminum Condensate Pumps

A line of automatic, cast aluminum pumps for condensate removal, whose primary application is removal of water from air conditioning systems, refrigerators, drinking fountains, etc., is announced by Hartell, Inc., Warminster, Pa.



Known as its Centriflow line, pumps are available in two sizes for 115 or 230-volt operation. Model A-1 pumps to a height of 10 ft, Model A-2 to 20 ft. Sand-cast aluminum reservoir with integrally-cast pump housing is said to provide strong, non-corrosive unit. Top inlet system provides a sump for accumulation of sediment. Stainless steel pins attach impellers to shaft, also made of stainless steel, to prevent impeller becoming loose or slipping on the shaft.

All units are factory assembled and adjusted. Overall dimensions are 6 x 9 x 9 inches.

More information? Circle Item 46, postcard, last page.

Vertical Unit Heaters

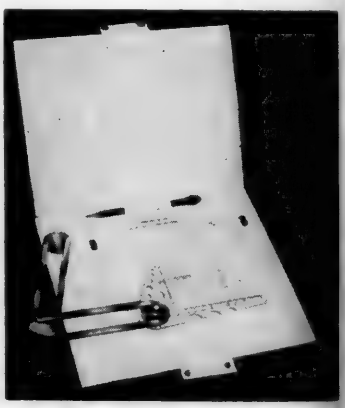
Round coil, vertical unit heaters in 22 models are announced by Airtherm Mfg. Co., St. Louis, Mo., ranging from 42,300 to 555,000 Btu per hr, which the company is adding to its 24 horizontal units, ranging from 18,000 to 270,000 Btu per hr to make up a new propeller unit heater line. The round coil verticals are offered with a choice of outlet diffusers to cover practically every air distribution pattern and mounting height, company states.

Silent operation is said to be assured by resiliently mounted motors. All fans are balanced and tested. Each unit is tested and rated in accordance with the Standard Test Code of the industry. Brand name, continuous duty motors, especially made for the purpose, are used. Motor removal is from below in all but the three smallest models. Coils are hydraulically expanded copper tubing in plate type aluminum fins, each with its own collar. Even fin spacing tends to reduce clogging. All coils are tested for 500 psi hydrostatic pressure. Casings are phosphatized to insure rust-free life for the baked enamel hammer tone finish.

More information? Circle Item 47, postcard, last page.

Portable Drafting Ensemble

Design Pak, manufactured by D. W. Price Corp., Los Angeles, Calif., and distributed by Tele-Muff Co., San Fernando, Calif., is a complete set of precision drawing equipment in a lightweight, attractive, portable case for architects and engineers who wish to make fast, accurate drawings in the field.



Incorporated in the device is a drafting machine, said to remain true over the entire 8½ by 11-inch drawing sheet; accurate vertical and horizontal scales, transparent and calibrated to 32nds; a holemeter; a compass device for 1 to 6-inch arcs; a 180-deg protractor that indexes and locks every 5 deg.

All components are mounted in a brief case which permits the drawing board to be used flat or in tilting position. Case comes in blue, brown, burgundy, and white.

More information? Circle Item 48, postcard, last page.

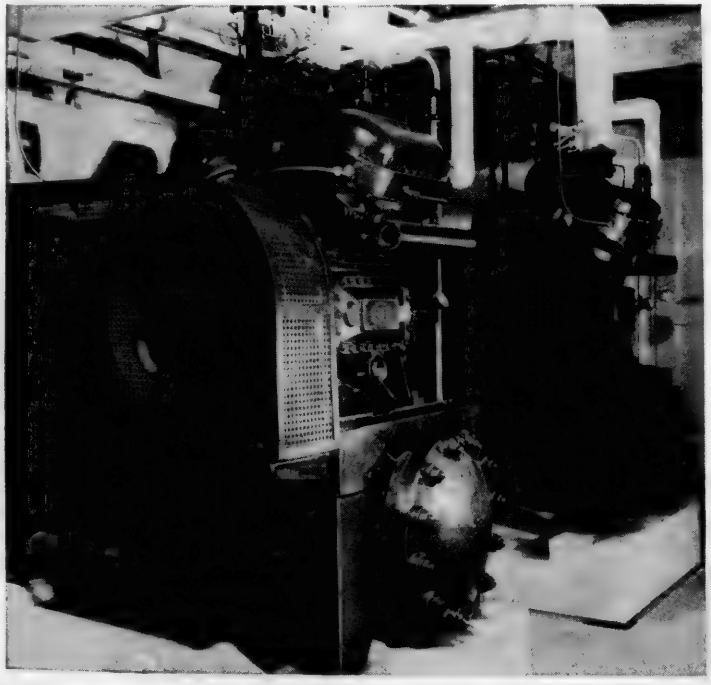
(Continued on page 114)

Air Conditioned Throughout with FRICK Refrigeration

4200 Marine Drive Apartments, Chicago, Ill. Architect: Lewis Simon. Mech. Eng.: Arthur Wallace. Installing Contractors: Midwest Eng. & Equipment Co., Economy Plumbing & Heating Co.

These sixty-four new apartments at 4200 Marine Drive, in Chicago, enjoy complete air conditioning, among other advantages.

Two "ECLIPSE" refrigerating units, installed by Midwest Engineering and Equipment Co., Frick Sales-Representatives in Chicago, carry the cooling load with economy and dependability.



What are YOUR cooling needs? If you want cool air, cold drinking water, ice, freezer temperatures, or refrigeration for processing—in any commercial or industrial size—let us quote now on your requirements. Branches and Distributors in principal cities, the world over.

Frick "ECLIPSE" refrigerating units at 4200 Marine Drive Apartments, Chicago

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA., U. S. A.

(Continued from page 112)

Waterproof Pipe Joint Compound

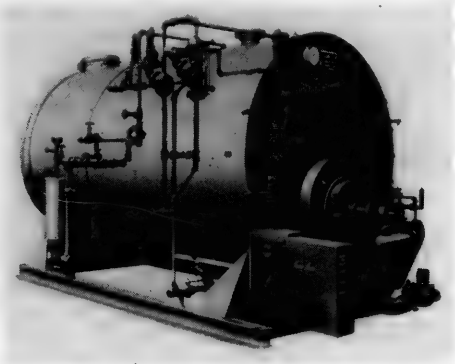
Permanent elasticity and much longer life in normal usage are two properties of the new-formula Key-Tite waterproof pipe joint compound, according to the manufacturer, W-K-M Division, ACF Industries, Inc., Houston, Tex.

Key-Tite will provide maximum seal in screw-thread and gasket joints, and will offer extreme resistance to aging in air. Also, the material is easier to spread, providing more uniform coverage of the surface and eliminating "seizing" of joints in gas, water, low-pressure steam, compressed air, and similar applications.

More information? Circle Item 49, postcard, last page.

Three-Pass Packaged Boilers

Western Boiler Co., Los Angeles, Calif., announces their new line of completely packaged steam generators available for firing all grades of fuel oil, gas, or combination oil-gas. Of advanced three-pass design, these boilers are available as forced draft, induced draft or pressure forced



draft units. Forced and induced draft ratings range from 25 to 600 hp while pressure forced draft models run from 10 to 100 hp.

Webco packaged boilers are factory assembled, wired and pre-tested, and 80% plus efficiency is guaranteed. All trim is factory installed and fitted. The boiler is encased with a metal jacketed, heat-resistant fiber glass sheath eliminating insulation work at the job site.

More information? Circle Item 50, postcard, last page.

New Coolant and Refrigerant

Called Halocarbon 437, a clear colorless liquid is announced by Halocarbon Products Corp., Hackensack, N. J., that company feels has most promising uses as a coolant or heat transfer medium on industrial equipment where water is not suitable due to possible hydrolysis or reaction with oxidizing agents if a leak should occur.

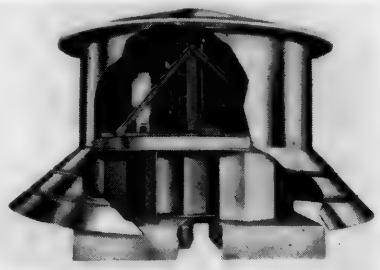
With boiling point of 208 deg F and freezing point of 39 deg, 2, 2, 3-trichloroheptafluorobutane may be applied as a refrigerant in the higher temperature range. A table of its physical properties is available.

More information? Circle Item 51, postcard, last page.

Quiet Power Roof Exhauster

The development of a Gyra-Flo power roof exhauster, designed for applications and installations requiring a minimum operating noise factor, is announced by Chicago Blower Corp., Franklin Park, Ill.

The unit, which is particularly useful for ventilating schools, theaters, hospitals, institutions, and other buildings where roof ventilation is applicable, is designed



to control the flow of air through the exhauster keeping turbulence and discharge losses to an absolute minimum.

The wheel of this belt driven unit, which is responsible for the quiet operation, is of the backward curve type, featuring steep pressure curves and non-overloading power characteristics. Constructed of stainless steel or other alloys, depending upon specific requirements, these ⅛-inch blades are backed by ¼-inch steel and are statically and dynamically balanced, producing vibrationless operations ranging from 830 to 29,750 cfm. This unit has high efficiencies from ½-inch s.p. and above.

More information? Circle Item 52, postcard, last page.

Liquid Level Transmitter

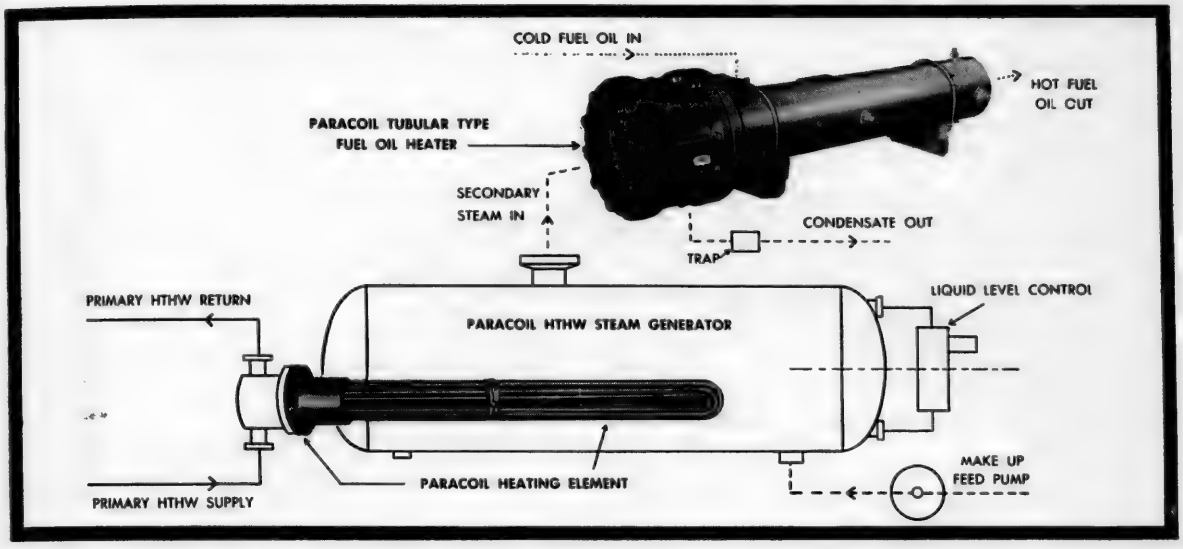
Model P pneumatic pressure and liquid level transmitter, available from Conoflow Corp., Philadelphia, Pa., measures to 250 psi, or ranges from 0 to 100 inches of water.

Operating on the force-balance principle, instrument transmits a linear 3-15 psi signal to a recorder, indicating gage, or manometer. It is suitable for many different services, and especially for those involving viscous fluids or materials which solidify in the static lines of pressure elements of conventional pressure transmitters. It can be mounted either horizontally or vertically on both open and closed tanks. No dip tubes, floats or other mechanical devices are required inside the vessel. Only the corrosion-resistant Inconel X diaphragm of the assembly is wetted by the measured material.

More information? Circle Item 53, postcard, last page.

(Concluded on page 116)

Idea no. 1 from Paracoil



CUT ALONG DOTTED LINE AND SAVE

How to use secondary steam to pre-heat no.6 oil in a High Temperature Hot Water system

Paracoil engineers know that the first consideration in the design of an oil preheating system for an HTHW installation must be absolute freedom from the possibility of oil leak contamination of the main HTHW stream. A completely isolated oil preheater circuit is recommended. This can be accomplished by means of a secondary heat transfer circuit that does the actual heating. In this way, only the secondary circuit is exposed to possible contamination — the main HTHW circuit is protected at all times.

One of the ways that this isolation is achieved is illustrated above. Additional isolation circuits will be commented upon in future "Idea Sheets". Watch for them!

How to design a protective circuit

1. **Install a steam generator.** Use a Paracoil Heating Element with the HTHW main energy stream as its heat source. With water at 350° F, steam at 25 psig (267° F) can be easily generated in an economically sized unit.
2. **Use the steam thus generated** . . . to heat the fuel oil in a Paracoil Tubular Oil-Type Fuel Oil Heater.* This type heater provides the highest rate of heat transfer — more than **three times** that of the conventional straight tube type.
3. **The condensate from the oil heater** . . . may be returned to the steam generator or sent to waste depending upon plant policy. If the re-use of the condensate is important, absolute surety of its quality can be obtained through the use of the Paracoil Oil Leak Condensate Inspection System.*

Paracoil engineers have designed and built many oil preheater protective systems for both stationary and marine installations. They now offer their experience and know-how to all who are involved in HTHW activities.

***Write for complete data.**

DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

(Concluded from page 114)

Versatile Gas Boiler Line

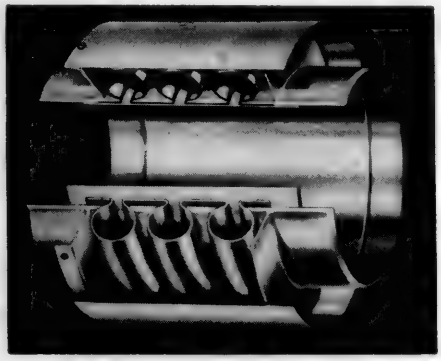
Series 16C gas boilers available from Heating and Air Conditioning Div., National-U.S. Radiator Corp., Johnstown, Pa., encompass a wide variety of sizes and functions. Approved for all gases, they include sizes to meet residential, commercial, and industrial heating and hot water supply requirements.

All units are designed for use with steam, vapor, gravity hot water, or forced hot water heating systems for both new installations and replacements. A special left end section is equipped with a flanged water heater opening, 4 sizes of storage tank heaters being available. **More information? Circle Item 54, postcard, last page.**

Corrugated Expansion Joints

A line of expansion joints for high-pressure, high-temperature applications is available from Zallea Brothers, Wilmington, Del.

Patented HyPTor toroidal corrugations, as in illustration, have circular cross section which is said to lower



operating stress at any pressure, so that bellows can be thinner to reduce flexing stress. There are no stress-producing, circumferential welds as a result of special forming technique, company states.

Usually made from stainless steel in 6-inch dia sizes and larger for pressures to 2000 psi, expansion joints of other materials for higher pressures are also available. Flanged or welding connections can be furnished. **More information? Circle Item 55, postcard, last page.**

Hot Paint Changes Color

Resin Research Laboratories, Inc., 406 Adams St., Newark 5, N. J., has developed a paint that changes color at high temperature, for Esso Standard Oil Company. The color change takes place at 575 deg F. It will be used by Esso as a safety measure to detect hot spots at its oil refineries. The paint might be used to detect breakdown of thermal insulation on high temperature water or high pressure steam lines, it has been suggested. In that case, should the outside of the insulation reach 575 deg, at some observable point in the lines, a color change would make the fact apparent. A similar application might be its use around boilers and furnaces.

Quick-Acting Vacuum Valve

Choice of flange dimensions and minimum space between flange faces on its 6-inch high vacuum valve enables systems designers to select flanging compatible with other components without special adaptors or extra fittings, announces the manufacturer, Vacuum Research Co., San Francisco, Calif.

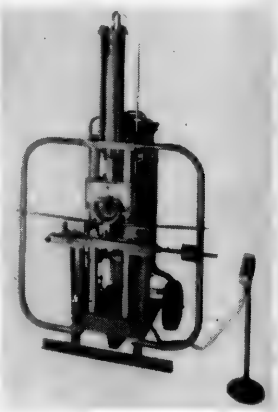
The valve, No. VG-106T, is a quick-acting type, with an unobstructed, straight-through opening. The slide action is actuated by a half-circle handle turn. There is no valve disc contact until closed, eliminating scuffing and wear. The closing action is a ball-and-socket principle with no pins to shear. Load is on the socket.

Also featured are a positively sealed O-ring stuffing box with no drag-through, light weight aluminum alloy construction, ventilated valve disc O-ring groove, case-hardened aluminum slide to prevent galling, and proved performance to pressures lower than 10^{-6} mm Hg.

Four standard flange combinations are available from stock and any special customer specification, within the limits of the flange diameters, is available on order. Details and a comprehensive data sheet are available. **More information? Circle Item 56, postcard, last page.**

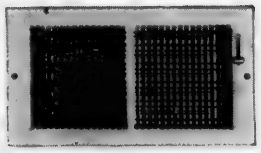
Ram Type Hydraulic Bender

Available from Wallace Supplies Mfg. Co., Chicago, Ill., is a vertical ram type bender used for press bending. Model No. 1402 accomplishes two things: It saves space (floor space measures 100 x 45 inches), and permits easier handling of material being bent.

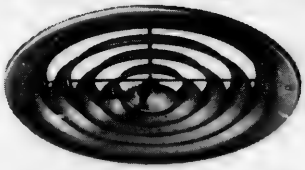


It bends to 180 deg with no repositioning of dies or relocating of material, bending up to 2-inch heavy steel pipe. Coils, return bends, special curves, angle irons, channels, reinforcing bars, and flat bars can be bent on this machine. A simple initial setting of the duplicator stop will make an unlimited number of the same bends, if desired. Machine is pushbutton controlled for maximum production output. A button is provided to facilitate set-ups quickly from field measurements or bent-wire templates.

Motor-driven hydraulic pump is mounted on an oil reservoir forming a part of the machine's structural frame. The pump supplies pressure under pushbutton control to a cylinder. This cylinder carries the ram for the sliding head that is carried on vertical bar-type ways. **More information? Circle Item 57, postcard, last page.**

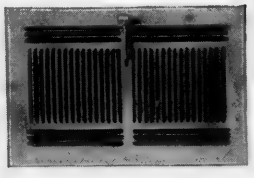


STANDARD 600 SERIES
WALL AND BASEBOARD
REGISTERS



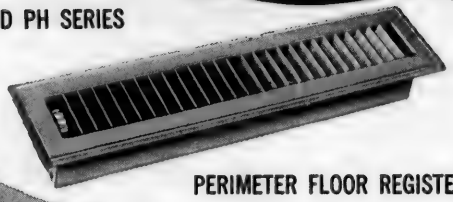
STANDARD CEILING AIR DIFFUSERS

STANDARD B SERIES
PERIMETER
BASEBOARD DIFFUSERS



STANDARD 551
PERIMETER WALL AND
BASEBOARD REGISTERS

STANDARD PH SERIES



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5 ways to guarantee comfort in two-way systems!

- easy installation
- trouble-free operation
- the right air distribution for every conditioned space
- for residential, commercial, and industrial buildings
- no blasts, no hot spots, no cold corners

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PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Electronic Machine Operation and Accuracy Fortified by Air Conditioning

Air conditioning has become an important element in the growing electronic automation of business, industry and defense. Modern computers, producing tremendous heat from their electrical systems while making intricate calculations, require extensive cooling to insure efficient operation. Electronic companies urge air conditioning because vacuum tube life is doubled, operators are more comfortable, and the equipment is less likely to be in error if the temperature and humidity are kept within prescribed limits.

Carrier Corporation has installed climate control systems for some of the largest electronic units in the country. Plants include International Business Machines; Ramo-Wooldridge, coordinator and developer for the technical development of the Air Force ballistic-missile program; Texas Instruments, a leader in semi-conductor production; Sylvania Electric Products, producer of semiconductors and vacuum tubes; and the ElectroData Division of Burroughs Corporation, producer of the Datatron computer.

Exacting air conditioning performance is necessary in such plants. With production of semi-conductors such as transistors, extremely pure materials are a necessity since a single speck of dust can render them useless. Temperature and humidity, too, must be carefully controlled because extremely close tolerances are essential in machines which may contain nearly one million parts. And major producers of electronic data processing units recommend that temperature, humidity and air purity be accurately governed in rooms where their equipment is installed since high temperatures may seriously damage the equipment. ElectroData Division of Burroughs Corporation recommends an operating temperature of 60 to 80 deg F to protect its computing equipment. Humidity should not exceed 60% because magnetic tape becomes sticky at higher temperatures, causing problems of registration resulting in wrong answers.

Another factor calling for the air conditioning of electronic data processing equipment is operator comfort, since electronic tubes produce large amounts of heat. To dispel this heat and cool adjacent areas as well, the company has developed several methods of computer room cooling. In its most simple application a self-contained Weathermaker unit may be sufficient for efficient operation and operator comfort.

Other installations are more complex. A two-part cooling system with a capacity of 74 tons has been installed in the Univac room of Franklin Institute in Philadelphia. In one-half of the system, a compressor circulates chilled water through a built-in Univac transfer surface to carry off heat generated by the electronic speedster. The other half supplies conditioned air for the room in which Univac is installed and an exhibit area from which the machine can be seen.

The largest computer ever air conditioned is said to be the Bizmac installation, cooled with the company's equipment for the U. S. Army's Ordnance Tank-Automotive Command in Detroit. It is composed of 361 recording, transcribing, and computing units, occupying some 20,000 sq ft of floor space. The conditioning equipment must remove 1,800,000 Btu per hr, enough to cool 75 average-size homes, to protect Bizmac against heat-induced damage.

High Temperature Couplings at Edison Plant Still There on Anniversary

PROBLEM: At the Astoria plant of Consolidated Edison Company of New York, temperature of pre-heated pulverized coal in lines to its huge boilers is around 150 deg F, while ambient temperatures, especially near the boilers, range as high as 325 deg F. As a result, life of conventional rubber seals in the expansion joints was limited to an average of six months, with occasional failures occurring within as little as a week. And, although the

seals themselves cost little, labor costs for replacement ranged from $50 to $100 each.

SOLUTION: Concerned over this unexpectedly high cost of maintaining the joints, Con Edison tested higher cost seals made from Silastic, the Dow Corning silicone rubber. Fabricated by Niagara Rubber of Plainfield, N. J., for the Victaulic Company, manufacturer of the couplings, the test seals, 234 of them spaced every 10 ft from the ball mills to boiler fireboxes, have now been in place for a year.

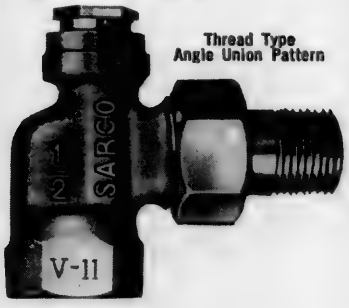
RESULTS: Con Ed reports the more expensive seals have already paid for themselves several times over by entirely eliminating replacement costs. Maintenance men are now planning to utilize these seals in every high temperature coupling in their system.

(Product Applications continued on page 120)

You don't have to treat 'em tenderly

. . . these burly Sarco Balancing Fittings are extra-strong!

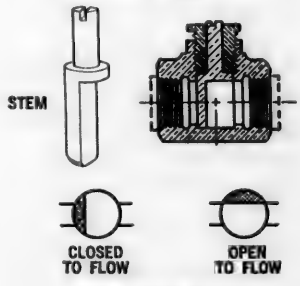
FOR USE UP TO 125 PSI
Every single one
TESTED AT 150 PSI!
Can be furnished with
INTEGRAL MANUAL AIR VENTS
All patterns also available in sweat-type.



Thread Type
Angle Union Pattern

Thread Type
Straightway Union
Pattern

Straightway Screwed Pattern



Solid segment stem which insures linear straight flow

4013-B

Check other Sarco features that save installation headaches . . . assure top heating performance . . . save you money

Yes, these Sarco fittings are really husky . . . made of heavy brass, of highest commercial quality. They won't crack when you put a wrench on them . . . as lighter fittings often do. Won't cause delays . . . waste high-cost time. Will save you money in the end.

More accurate heat distribution is assured by the solid segment stem of Sarco Balancing Fittings (see cross-section diagram, right). Insures linear straight line flow, not obtainable with the usual butterfly stems.

Integral manual air vents can be furnished with Sarco Balancing Fittings. Their use avoids the headaches and costly time waste when a system has to be drained to release air.

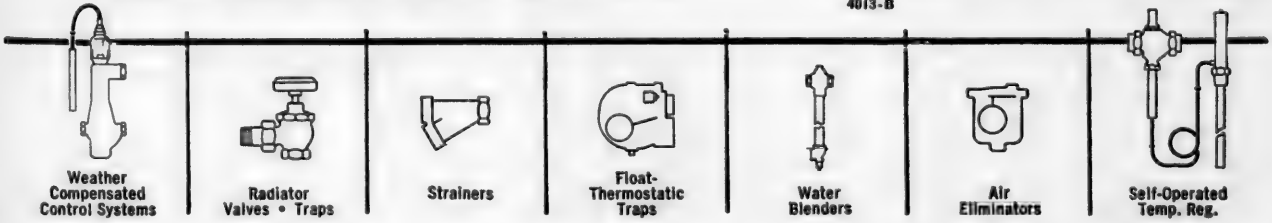
Sarco Balancing Fittings are made in thread and sweat types; all patterns. Also available . . . complete quality lines of access boxes for balancing fittings; valves; air eliminators. Ask for bulletins.

For undivided responsibility on your installations, specify and order from one "Complete Line" source . . . SARCO-SARCOTHERM. Sarcotherm Controls, Inc., 635 Madison Ave., New York 22, N. Y.

Sarcotherm

AN AFFILIATE OF SARCO CO., INC.

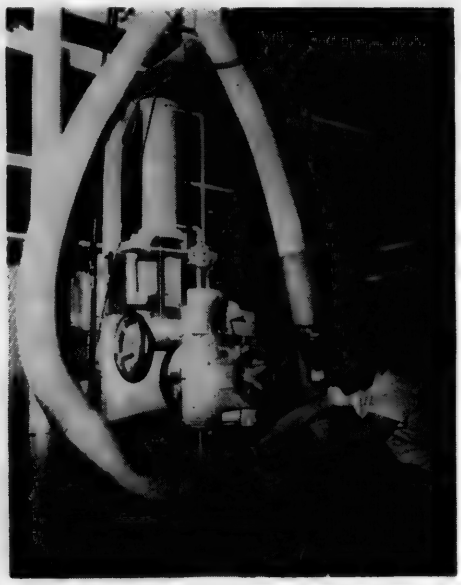
Products you can rest your reputation on



Warm Exhaust Air from Dust Collector Supplies Air Curtain for Shop

PROBLEM: Heated air, exhausted along with sawdust and fine metal particles from the wood and pattern shops of Boeing Aircraft Co., Seattle, Wash., was written off as a complete loss.

SOLUTION: A cloth-tube type dust collector, manufactured by Wheelabrator Corp., Mishawaka, Ind., replaces cyclone collectors. Clean air from the collector, 40,000



cfm of it, goes through a large pipe on the factory roof. The majority is blown in front of the maintenance entrance door. Air in circuit is approximately 70 deg F with very small heat loss. Steam coils installed near the door raise air temperature to 150 deg when door is opened, forming a curtain to protect the interior. In summer, air is vented outside.

RESULTS: Estimated saving, based on conservation of 2,400 lb steam per hr in cold weather, is $5400 annually.

Nylon Molding Compound Solves Propane Seal Problem

A float ring molded of nylon for use with a quick-disconnect fitting for domestic propane systems, was the successful answer to a problem encountered by Black. Sivalls & Bryson, Inc., Kansas City manufacturers.

Fittings for domestic propane systems have traditionally been held into and sealed to tanks through the use of taper pipe threads. It was the unavoidable non-uniformity of the threads plus the difficulty of assembly which stimulated the search for a new way to secure the fittings to the tank as well as seal the high pressure liquified petroleum gas inside the tank.

The search led the company to consider another type of connection-seal device — a float ring seal which had been used for some time by the firm in its high pressure quick-disconnect fittings for the petroleum industry. The device consists of a wedge-shaped ring which contacts a concave truncated cone on the male fitting and a convex truncated cone on the female fitting, affecting a seal by close juxtaposition. Because the ring is wedge-shaped, the pressure on its broad underside causes it to float up into the narrowing opening, making the seal progressively tighter as the pressure increases.

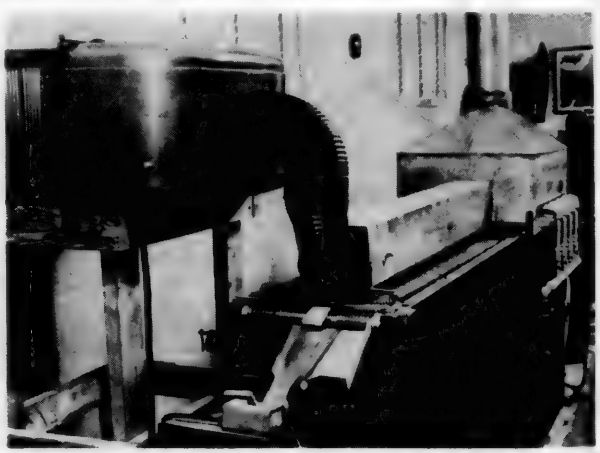
One factor, however, which made this float ring seal appear unsuitable for use with propane was the fact that it had to be made of a material which is substantially softer than the material of which the male and female portions of the piping assembly are made. This poses no problem in the oil field application since both portions of the fittings are usually of steel, but on domestic propane systems the fittings are necessarily of brass.

Due to the intense unit pressure applied to the ring and the resultant sliding action, every experimental metallic material soon work-hardened to the point that it was harder than the brass cone on the fittings — thus it scored and scratched the cone.

This difficulty led logically to a consideration of plastic for the float ring material. After considerable engineering exploration and trial-and-error by company engineers working with Avsco, Inc., Excelsior Springs, Mo., the choice was narrowed down to the polyamide series of organic plastics. Of this group, Plaskon Nylon 8200 molding compound was chosen—because of its outstanding ability to withstand high compressive forces without work hardening; excellent resistance to cold-flow; its insolubility in hydrocarbons; its clear unpigmented color and its uniformity of quality in the finished product.

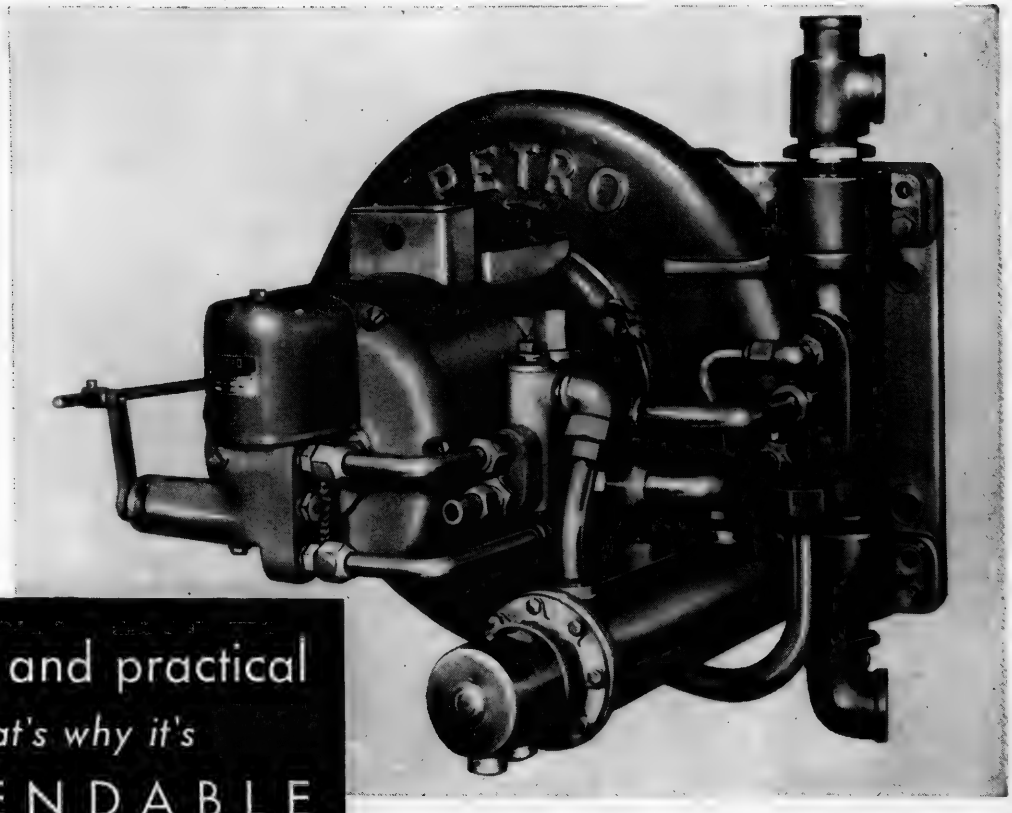
Room Air Conditioner Adds Quick Cooling System For Specialty Card Printing

When temperature and humidity soared in Dallas, Tex., Crescent Card Company had found it necessary to stop its embossing press while cards were spread by hand over blotters to dry ink and harden resin dust.



A successful answer consists, as illustrated, in mounting a standard Carrier room air conditioner on a platform at the end of the press conveyor belt to blanket finished stock with cool, conditioned air. Dehumidified air is a constant 55 deg which aids in setting resin dusted over the printed cards and makes possible a perfect embossed printing.

Petro HEAVY OIL BURNER



Simple and practical *that's why it's* DEPENDABLE

Residual oils are low cost fuels. They have higher heat value than light oils, and usually cost less per gallon. But in spite of their economy they are often avoided because they are considered difficult to handle and burn. A moderate change in temperature can change them from a fluid to a sluggish semi-solid.

These heavy oils (Nos. 5 and 6) are easily controlled and burned by the Petro system which is remarkably free from mechanical complexities.

1. A simple oil heater automatically warms the oil to a point where a common viscosity is reached. (Fuel oils approach this at a temperature of about 160 degrees).

2. An automatic valve passes the oil to the nozzle only when it is warm enough for accurate metering and instant ignition.

This is the basis of the Petro "Thermal Viscosity Principle." The Petro burner isn't fancy; it isn't temperamental; but it *stays on the job.*

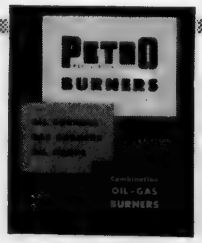
In spite of its ruggedness, the Petro heavy oil burner is precision equipment which will operate efficiently with any type of automatic control system.

Petro oil burners have been the steady, reliable work horses in heavy oil firing for over 50 years. They have saved their owners untold thousands of dollars in low fuel and maintenance costs.

For further information, please mail coupon.

Send for this PETRO® catalog

Over 50 years of leadership in automatic heating and power equipment



PETRO, 3526 W. 106th Street, Cleveland 11, Ohio.
In Canada, write to 80 Ward Street, Toronto, Ontario.

Please send me literature and specification sheets on the money-saving Petro forced draft firing system.

Name_____
Company_____
Address_____
City_____ State_____

DEGREE-DAYS FOR OCTOBER, 1957

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 30th Year of Publication of Monthly Degree-Day Data

City	October			Season to Oct. 31, incl., from Sept. 1		
	1957	1956	Normal	1957	1956	Normal
Abilene, Texas (A)	141	36	98	147	36	76
Albany, New York (A)	450	464	443	602	726	582
Albuquerque, New Mexico (A)	270	195	218	273	195	228
Alpena, Michigan (C)	565	422	530	810	776	745
Asheville, North Carolina (C)	398	197	262	458	279	312
Atlanta, Georgia (A)	207	49	110	243	54	118
Atlantic City, New Jersey (C)	258	183	230	298	253	259
Augusta, Georgia (A)	168	41	59	187	59	59
Baltimore, Maryland (C)	233	128	207	266	188	236
Billings, Montana (A)	623	425	497	811	565	691
Binghamton, New York (C)	489	388	428	620	611	569
Birmingham, Alabama (A)	217	62	123	241	64	136
Bismarck, North Dakota (A)	605	485	598	869	772	825
Block Island, Rhode Island (A)	316	306	330	383	431	418
Boise, Idaho (A)	470	453	389	535	548	524
Boston, Massachusetts (A)	317	330	315	374	504	392
Buffalo, New York (A)	456	290	433	596	508	555
Burlington, Iowa (A)	407	137	336	504	220	419
Burlington, Vermont (A)	503	480	521	672	778	693
Cairo, Illinois (C)	226	50	161	233	55	189
Charleston, South Caroline (C)	90	13	34	92	16	34
Charlotte, North Carolina (A)	229	87	147	266	133	154
Chattanooga, Tennessee (A)	269	96	169	288	111	193
Cheyenne, Wyoming (A)	553	445	577	837	581	818
Chicago, Illinois (C)[b]	397	140	350	486	212	440
Cincinnati, Ohio (C)	292	93	222	322	143	264
Cleveland, Ohio (A)	402	198	340	499	357	415
Columbia, Missouri (A)	321	81	262	368	112	324
Columbia, South Carolina (A)	160	45	76	180	68	76
Columbus, Ohio (C)	385	153	299	444	247	358
Concord, New Hampshire (A)	482	532	527	649	855	719
Concordia, Kansas (C)	340	128	277	394	169	332
Dallas, Texas (A)	127	14	53	127	14	53
Dayton, Ohio (A)	410	171	324	487	277	397
Denver, Colorado (A)	420	277	425	561	345	545
Des Moines, Iowa (A)	449	162	355	562	265	454
Detroit, Michigan (A)	432	240	381	562	412	477
Devils Lake, North Dakota (C)	655	541	654	995	914	930
Dodge City, Kansas (A)	336	128	262	391	144	302
Dubuque, Iowa (A)	510	239	444	690	412	593
Duluth, Minnesota (C)	669	493	614	1026	908	891
Elkins, West Virginia (A)	554	302	412	663	491	534
El Paso, Texas (A)	127	65	70	127	65	70
Ely, Nevada (A)	659	637	561	911	796	789
Escanaba, Michigan (C)	561	422	933	853	767	802
Evansville, Indiana (A)	333	121	215	361	176	274
Fargo, North Dakota	568	405	586	842	696	801
Fort Smith, Arkansas (A)	194	42	131	197	42	140
Fort Wayne, Indiana (A)	467	222	377	607	363	484
Fort Worth, Texas (A)	144	21	58	144	21	58
Fresno, California (A)	79	135	86	79	135	86
Galveston, Texas (C)	49	0	0	49	0	0
Grand Junction, Colorado (A)	340	281	333	395	289	369
Grand Rapids, Michigan (A)	511	289	462	707	486	606
Green Bay, Wisconsin (A)	586	367	515	849	667	698
Greensboro, North Carolina (A)	324	172	202	376	247	231
Greenville, South Carolina (A)	234	113	131	277	156	141
Harrisburg, Pennsylvania (A)	376	295	308	452	441	377
Hartford, Connecticut (A)	424	468	384	547	735	485
Hatteras, North Carolina (C)	(a)	7	63	(a)	9	63
Havre, Montana (C)	753	538	564	957	748	834
Helena, Montana (A)	738	724	617	1002	724	937
Houston, Texas (C)	71	0	0	71	0	0
Huron, South Dakota (A)	501	345	472	691	531	621
Indianapolis, Indiana (A)	415	143	306	505	247	385
Jackson, Mississippi (A)	149	30	69	166	30	69
Kansas City, Missouri (A)	302	63	240	331	80	284
Knoxville, Tennessee (A)	262	75	179	285	106	212
La Crosse, Wisconsin (A)	509	239	447	687	426	599
Lander, Wyoming (A)	576	486	632	843	617	876
Lewiston, Maine (O)	509	538	501	696	830	666

(a) Data not available. [b] 1957 and normal figures are for Midway Airport; 1956 figures are for Grant Park Station.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. [Table concluded on page 124]

from Chicago

MODERN TODAY
MODERN IN 2007 A.D.

WORLD'S FIRST BRONZE SKYSCRAPER HAS CHICAGO "FLUSH KLEEN"® SEWAGE PUMPS

375 Park Avenue — New York

MIES van der ROHE and PHILIP JOHNSON
architects

KAHN & JACOBS
associate architects

JAROS, BAUM & BOLLES
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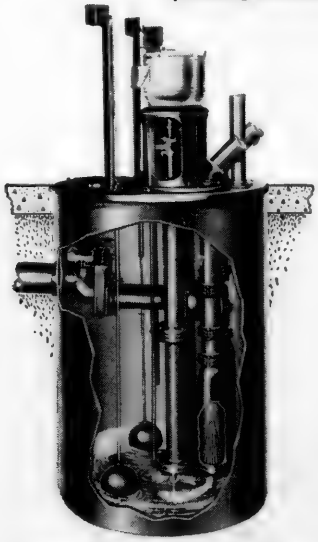
GEORGE A. FULLER CO.
general contractors

EUGENE DUKLAUER, INC.
plumbing contractor



"FLUSH KLEEN"® Sewage Pump . . . Automatically Backwashes Strainer . . . Strainer Keeps Solids From Basin and Pump . . . Water Only Handled By Impeller.

• The new 375 Park Avenue Building, New York, literally has EVERYTHING— and *everything* is QUALITY. Quality ideas, plans, materials and workmanship have provided such modern conveniences as year-round peripheral zoned air conditioning with balanced humidity and finger-tip control, 18 electronically controlled high-speed elevators, closed circuit color television, special non-glare exterior glass walls, etc. Chicago "FLUSH KLEEN"® Sewage Pumps have provided for continuous, trouble-free waste disposal service.

More than 12,000 Chicago "FLUSH KLEEN"® Sewage Pumps have been installed as standard equipment in fine buildings everywhere — and NOT ONE HAS EVER CLOGGED. Only liquid reaches the pump impeller. There is no contact between the pump's working parts and coarse sewage material.

This is why Chicago Pump Company "FLUSH KLEEN"® Sewage Pumps have an unequalled record of clog proof performance and are preferred throughout the building industry.

CHICAGO PUMP COMPANY
Building Pumps
Subsidiary of Food Machinery & Chemical Corporation
fmc
622 Diversey Parkway
Chicago 14, Illinois

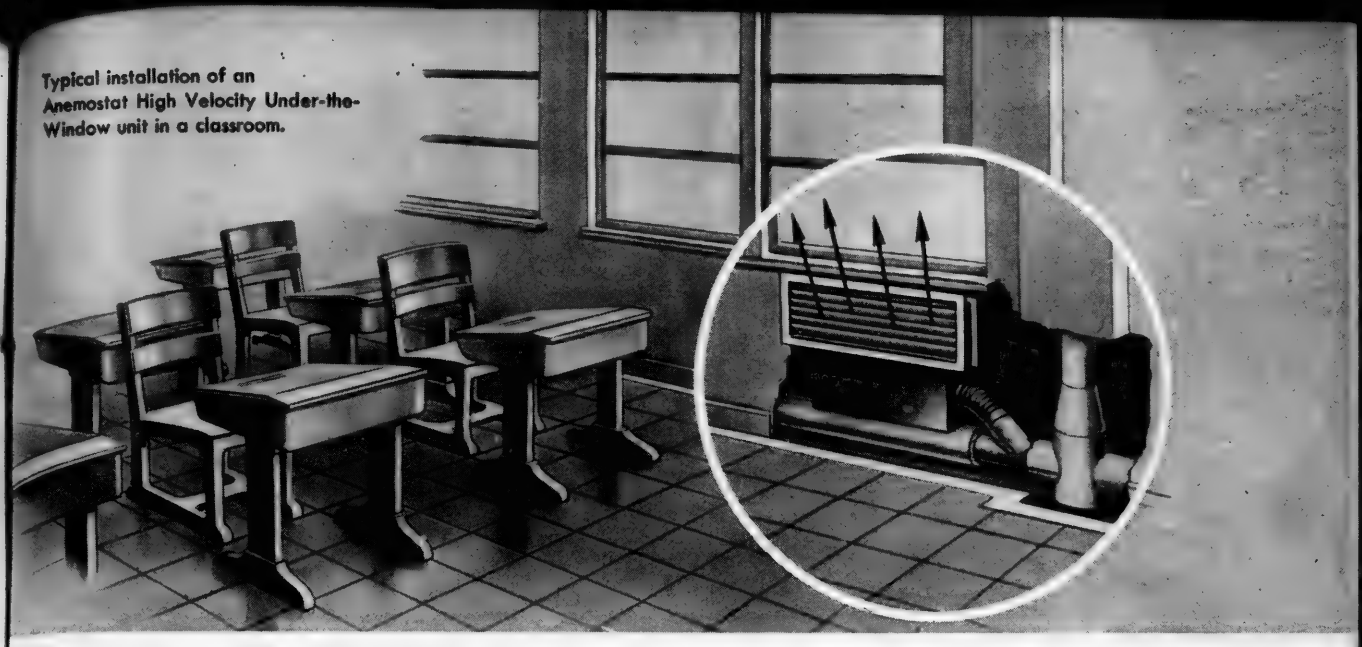
Degree-Days for October, 1957 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING'S 30th Year of Publication of Monthly Degree-Day Data

City	October			Season to Oct. 31, incl., from Sept. 1		
	1957	1956	Normal	1957	1956	Normal
Lincoln, Nebraska (C)	386	145	310	462	198	389
Little Rock, Arkansas (A)	164	33	110	164	33	120
Los Angeles, California (C)	16	34	41	16	34	58
Louisville, Kentucky (A)	316	131	232	338	194	283
Lynchburg, Virginia (A)	365	216	236	430	308	285
Macon, Georgia (A)	128	23	63	150	28	63
Madison, Wisconsin (A)	535	285	419	732	418	556
Marquette, Michigan (C)	516	363	543	775	725	779
Memphis, Tennessee (A)	191	48	126	197	48	143
Meridian, Mississippi (A)	149	39	90	171	39	90
Milwaukee, Wisconsin (A)	503	287	428	696	475	562
Minneapolis, Minnesota (A)	500	271	459	684	473	616
Moline, Illinois	467	189	363	603	298	459
Montgomery, Alabama (A)	133	26	69	150	26	69
Nashville, Tennessee (A)	270	73	154	280	83	176
New Haven, Connecticut (A)	377	363	363	464	528	456
New Orleans, Louisiana (C)	63	0	5	69	0	5
New York, New York (C)	268	216	263	315	318	302
Newark, New Jersey	289	244	301	343	361	348
Norfolk, Virginia (A)	214	69	152	223	90	161
North Platte, Nebraska (A)	482	315	425	665	435	545
Oak Ridge, Tennessee	254	69	225	266	89	225
Oakland, California (A)	97	208	157	105	244	233
Oklahoma City, Oklahoma (A)	263	72	149	280	72	161
Omaha, Nebraska (A)	404	161	331	495	239	419
Parkersburg, West Virginia (C)	389	159	272	438	269	328
Peoria, Illinois (A)	408	129	339	478	203	425
Philadelphia, Pennsylvania (C)	256	177	219	296	250	252
Phoenix, Arizona (A)	12	47	13	12	47	13
Pittsburgh, Pennsylvania (C)	394	183	298	458	310	354
Pittsfield, Massachusetts	548	499	543	753	826	756
Pocatello, Idaho (A)	538	550	487	704	688	670
Portland, Maine (A)	468	519	515	652	826	714
Portland, Oregon (C)	295	346	280	305	410	365
Providence, Rhode Island (A)	368	394	381	461	588	488
Pueblo, Colorado (A)	324	251	383	405	270	457
Raleigh, North Carolina (A)	295	129	118	333	187	128
Rapid City, South Dakota (A)	553	364	500	742	483	693
Reading, Pennsylvania (C)	338	243	285	402	370	342
Red Bluff, California (A)	149	137	59	159	137	59
Reno, Nevada (A)	556	528	443	672	644	608
Richmond, Virginia (A)	317	146	210	367	221	243
Rochester, New York (A)	477	342	440	635	581	573
Roswell, New Mexico (A)	223	107	156	233	107	164
Sacramento, California (C)	103	123	75	105	123	92
St. Joseph, Missouri (A)	365	115	233	419	151	282
St. Louis, Missouri (C)	281	68	202	298	85	240
Salt Lake City, Utah (A)	401	399	381	502	457	469
San Antonio, Texas (A)	71	3	25	71	3	25
San Diego, California (A)	8	35	52	8	35	52
Sandusky, Ohio (C)	409	179	327	504	315	393
San Francisco, California (C)	81	169	128	137	260	238
Sault Ste. Marie, Michigan (A)	590	490	639	908	913	937
Savannah, Georgia (A)	107	28	38	110	28	38
Scranton, Pennsylvania (A)	479	394	389	618	635	504
Seattle, Washington (C)	337	379	329	367	526	463
Sheridan, Wyoming (A)	637	483	578	885	642	817
Shreveport, Louisiana (A)	115	23	53	115	23	53
Sioux City, Iowa (A)	460	197	405	393	311	533
Spokane, Washington (A)	612	572	508	718	721	713
Springfield, Illinois (A)	392	116	259	464	181	315
Springfield, Missouri (A)	310	85	249	351	108	310
Syracuse, New York (A)	457	373	396	588	598	513
Toledo, Ohio (A)	471	256	387	616	446	489
Topeka, Kansas (C)	318	80	242	354	105	284
Trenton, New Jersey (C)	311	240	285	371	363	340
Tulsa, Oklahoma	225	41	152	230	41	170
Utica, New York (O)	349	365	430	564	601	612
Valentine, Nebraska (A)	511	352	461	697	490	606
Walla Walla, Washington (C)	446	382	308	488	434	401
Washington, D. C. (C)	305	158	231	348	237	263
Wichita, Kansas (A)	323	81	219	358	93	251
Williston, North Dakota (C)	668	537	605	903	801	866
Winnemucca, Nevada (A)	604	559	508	757	709	688
Yakima, Washington (A)	522	511	446	604	642	596

For footnotes, see page 122.



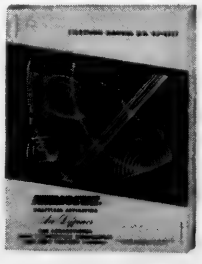
Typical installation of an Anemostat High Velocity Under-the-Window unit in a classroom.

How to deliver
high velocity air to schoolrooms

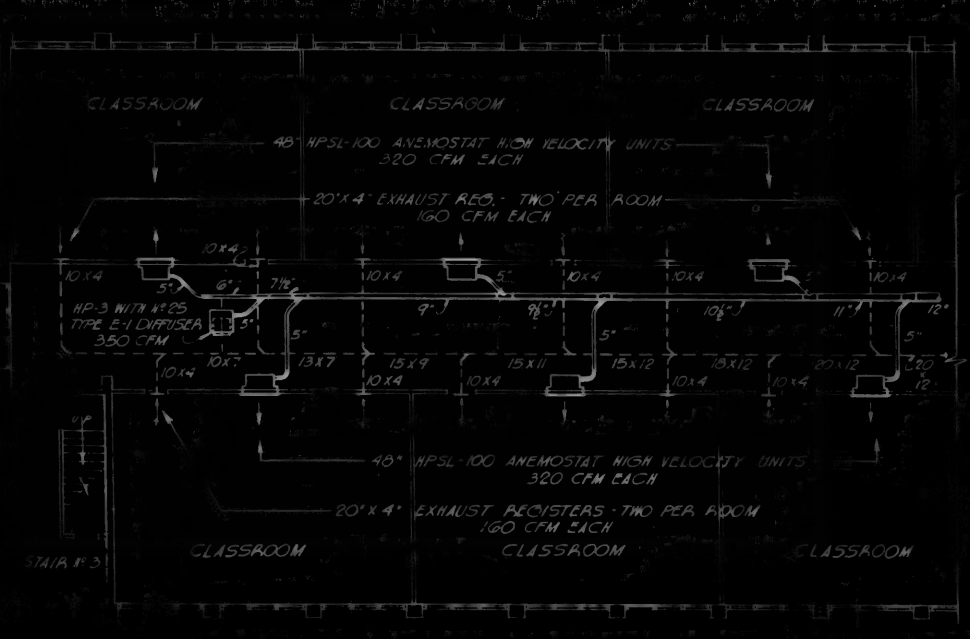
Shown here are two ways of using the Anemostat All-Air High Velocity system of draftless air distribution for heating and ventilating schools. Under-the-Window units (above) are the most practical for colder climates. Corridor distribution (below) is preferable in warmer climates.

Advantages:

- All-Air High Velocity units require smaller than conventional ducts, thus save space and money.
- All-Air HV units can be used for individual or zone control, in single or dual duct installation.
- Since air is supplied from the main equipment room, there is no need to break through the outside of the building for prime air make-up. This eliminates grilles, dampers, possibility of leaks.
- The Anemostat All-Air HV system can be simply installed by the sheet metal trades. No supply or return pipes are required. Units are quiet, need a minimum of maintenance from custodians.



For latest data on All-Air High Velocity units, write on your business letterhead for new Selection Manual 60 to Anemostat Corporation of America, 10 E. 39 Street, New York 16, N. Y.



Diagrammatic layout shows corridor distribution of high velocity air for wing of school.

NEWS OF THE MONTH

NEW INFORMATION BUREAU

to spur development of a greatly expanded market for plumbing, heating, and cooling products and services.

Expansion of the 38-year-old Plumbing and Heating Industries Bureau and amalgamation of the All-Industry Plumbing and Heating Modernization Committee into a new Plumbing-Heating-Cooling Information Bureau for an all-industry effort to expand its market, was announced at the 63rd annual meeting of the Central Supply Association in Chicago in October. The Bureau will serve as the designated agency for planning and executing industry-wide mass publicity campaigns and educational programs.

Objectives are to increase public respect for the industry and its products through a greater knowledge of their importance in daily living; increase and stabilize employment in all segments of the industry; and increase sales volume in all fields.

• **TO TAP MODERNIZATION MARKET**— A current state of imbalance is said to exist between productive capacity and the demands of new homebuilding, that is, the industry is geared to produce more than the market calls for, resulting in idle machines and idle men. Members of the industry find themselves fighting for a share in a dwindling market. What should be happening, proponents of the Bureau maintain, is united campaigning to tap the rich and relatively untapped market in the modernization of existing homes.

Six goals of activity for the Information Bureau are projected:

(1) Conduct a year-round program aimed at the local level; (2) Set up a school of plumbing-heating-cooling marketing to train merchandisers capable of keeping up with the market; (3) Establish a consumer information and education center; (4) Promote intra-industry communication; (5) Promote market research and market discovery; and (6) Coordinate all efforts with the national program of action in home remodeling and neighborhood reclamation.

A unique plan has been developed to raise funds for the Bureau. Everyone who earns his livelihood from the plumbing-heating-cooling industries will be urged to contribute a dollar toward the industry-wide promotional program. (Over a million persons are gainfully employed by the combined industry.)

Any firm, sole proprietorship or corporation in the industry is eligible for membership in the expanded organization.

HEAVY COPPER IMPORTS

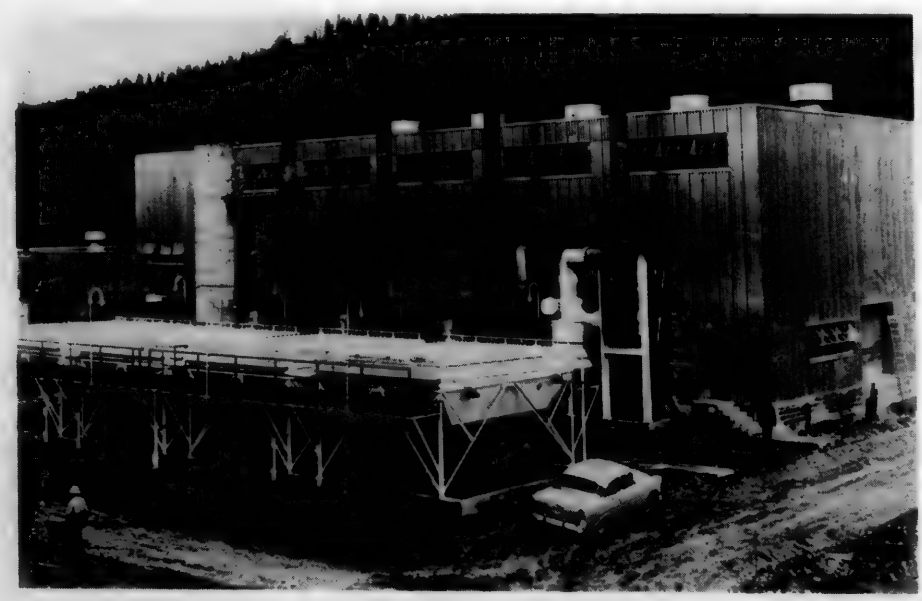
stir industry suggestions for import tax, increased tariffs, or quotas, reversing liberalized trade trends.

Brass mill product imports have risen to the rate of 100 million lb per year, spurring suggestions from Copper & Brass Research Association, New York, N. Y., industry spokesman, for immediate relief for "essential industries now being severely hurt" by such imports.

The case of seamless brass tube is cited as typical: In 1950, import of this item totaled 0.96% of the domestic market. In the first six months of 1957, however, the percentage had climbed to 16.

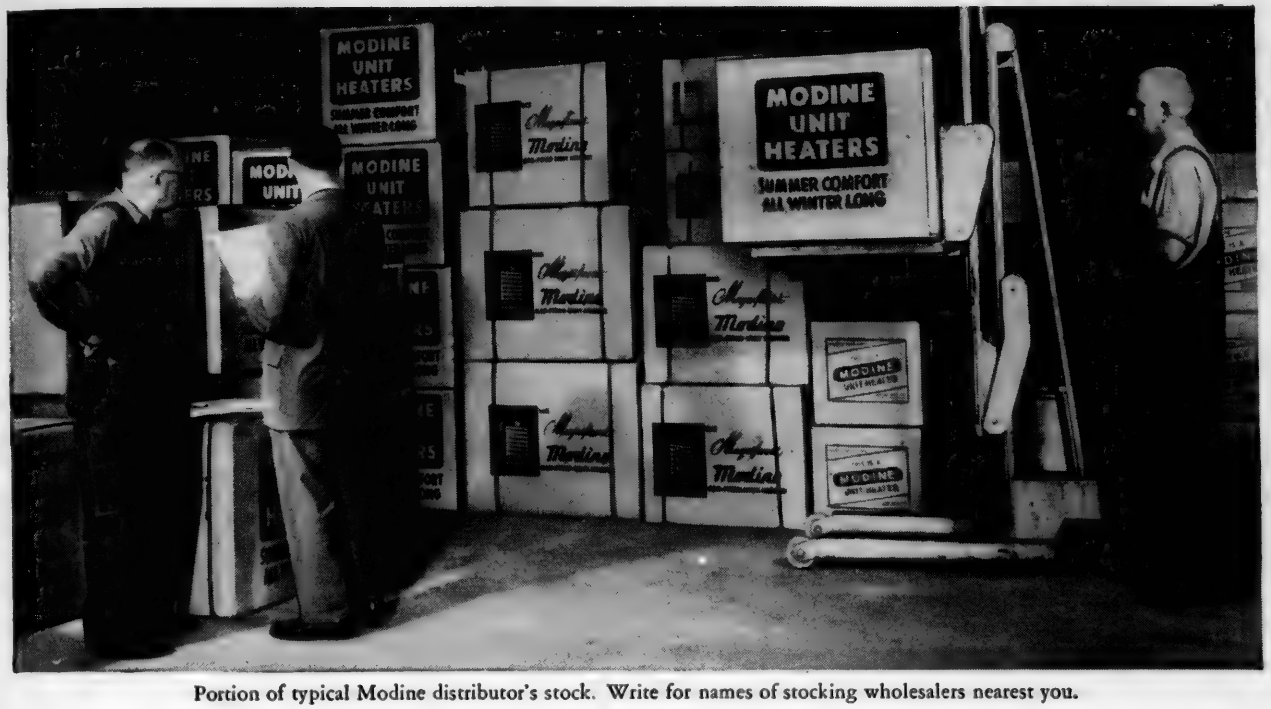
Immediate relief sought would be on an interim quota basis, pending investigations and hearings. Should the situation prove to be as alleged, one of three permanent relief measures might be adopted: a wage-cost equalization tax, increased tariffs, or quotas. The wage-cost item is suggested by the disparity in real wages between workers in exporting countries and United States brass

(Continued on page 128)



Largest fluid coolers ever manufactured by The Trane Co., LaCrosse, Wis., will cool jacket water of gas engines which, in turn, will drive compressors that pump natural gas through Canada's 650-mile, 30-inch pipeline. Twenty coolers ordered to date will be located in four British Columbia compressor stations located near Taylor Flats, Fort McLeod, Australian, and Savona. The air-cooled chillers are 12 ft high, 17 ft wide, and 23 ft long. They have shutters for control of their forced vertical air flow. Installation is out-of-doors at each gas transmission station, and the cooling systems are filled with an anti-freeze solution.

117 MODINES to fit any heating job



Portion of typical Modine distributor's stock. Write for names of stocking wholesalers nearest you.

any type, any size, any style

It's easier to meet exact heating requirements when you're selecting unit heaters from the complete Modine line. No matter what the mounting height, temperature or heat-throw demands—Modine has the answer. And buyers are assured of highest quality *because Modine designs and manufactures its own unit heaters.*

● Modine steam and hot water units provide perfect heating comfort at lowest possible fuel costs because the discharge temperatures are correctly related to heat throw and air volume.

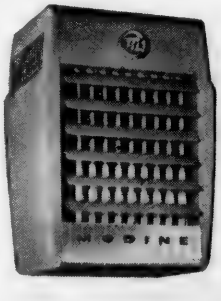
● Modine's gas-fired unit heaters last longer, cost less to install. Direct firing of tubes and reduction of heat exchanger mass give you heat within seconds.

For all the facts, see the Modine representative listed in your classified telephone directory. Or you can write directly to Modine Mfg. Co., 1511 DeKoven Avenue, Racine, Wisconsin.

102 STEAM OR HOT WATER UNIT HEATERS

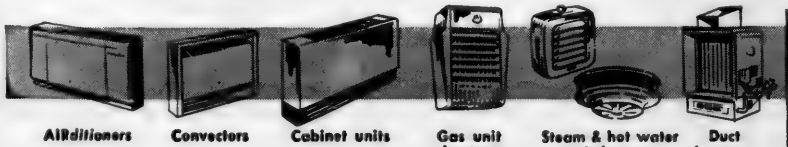
Choose from 38 horizontal, 44 vertical and 20 power throw models. Of these, 38 are high corrosion resistant (HCR) models, 48 are low outlet temperature models. Write for a copy of Bulletin 157.

U-1361



15 GAS-FIRED UNIT HEATERS

All Modine gas-fired units have stainless steel burners. Eight models also feature *stainless steel* heat exchangers. The other 7 are equipped with *aluminzed steel* heat exchangers. For more information on these outstanding units write for Bulletin 657



AIRditioners | Convectors | Cabinet units | Gas unit heaters | Steam & hot water unit heaters | Duct furnaces

In Canada: Sarco, Ltd., Toronto

Modine
MANUFACTURING COMPANY

mill workers. The 1955 domestic wage rate of $1.88 an hour compares to 66c for the United Kingdom, 47c for Germany, 40c for France, 90c for Sweden, and 22c for Japan, according to an International Labor Office survey. Thanks in great part to training given visiting productivity teams in American brass mills during the post-war period, depressed foreign wage rates do not at all reflect foreign productivity.

GAS-OPERATED AIR CONDITIONER

developed for residences. Will help gas industry balance winter heating loads with summer cooling.

Development of a residential gas-fired air conditioner by Carrier Corp., Syracuse, N. Y., was announced by Lyle C. Harvey, senior vice-president of the company and formerly president of Affiliated Gas Equipment, Inc., which was merged into Carrier in 1955.

The new device has been tested for a season and will undergo further exhaustive performance studies during the coming year. It is hoped that production of a lower-cost gas-fired unit, more competitive with other types of central air conditioners, may enable the gas industry to build summer usage to match winter home-heating requirements.

Designed for installation with gas-fired heating systems, converting them to year-round usefulness, the absorption cooling apparatus itself will be located in a cabinet installed outside the house. It will be an air-cooled water chiller operating on the absorption principle.

ELECTRONIC COMPUTER

permits rapid calculation of data for heat loss tables to guide insulation manufacturer's salesmen.

A high-speed electronic computer is being used by Johns-Manville's Industrial Insulations Division to help prepare heat transmission tables and tables showing recommended insulation thicknesses based on economic considerations.

According to C. E. Ernst, senior engineer, shown checking information on tables with a programmer of Service Bureau Corp., a subsidiary of International Business Machines Corporation, calculation formulae, thermal conductivities, surface coefficients, pipe dimensions, and thicknesses are given to the data processing Service Bureau for the heat transmission tables. Additional information must be fed through the computer for the calculation of economic thicknesses such as: cost of heat, annual hours of operation, unit cost of insulation, and yearly fixed charge for insulation. When all of this information is fed into the 704 computer, it produces the mass of data required for compiling the tables.

Information is fed to the computer on magnetic tape. This tape is stored by IBM for future use in revising the tables, thereby cutting down the work time and cost. These tables provide the company's sales representatives with the information to guide customers in selecting insulation.

ASHAE PROGRAM

announced for annual meeting to be held in Pittsburgh, January 27-29.

Seven technical sessions, some running simultaneously, have been arranged for the sixty-fourth annual meeting of the American Society of Heating and Air-conditioning Engineers which will be held at the Penn-Sheraton, Pittsburgh, Pa., January 27 to 29.

Several inspection trips have been arranged for Monday and Tuesday afternoons. Entertainment includes the Welcome Luncheon on Monday, a Gay Nineties Party that evening, and the annual banquet on Wednesday evening.

The papers that will be presented at the various technical sessions follow:

Monday — January 27

9:00 a.m. FIRST SESSION
Report of President—P. B. Gordon
Report of Treasurer—C. H. Pesterfield

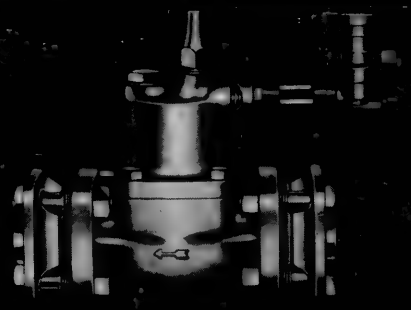
TOPICAL SESSION ON SOLAR ENERGY
R. C. Jordan, *Chairman*
Direct Sun Radiation Availability on Clear Days, by J. L. Threlkeld and R. C. Jordan
A High-Flux Low-Temperature Solar Collector, by R. G. Nevins and P. E. McNall, Jr.
Performance of a Solar Heated Office Building, by F. H. Bridgers, D. D. Paxton and R. W. Haines
Sun-Energy Assistance for Air-Type Heat Pumps, by C. P. Davis, Jr. and R. I. Lipper

Tuesday — January 28

9:30 a.m. SECOND SESSION
Report of Committee on Research—
H. A. Lockhart, *Chairman*
Cooling Load from Thermal Network Solutions, by Harry Buchberg
The ASHAE Air-Borne Dust Survey, by K. T. Whitby, A. B. Algren, R. C. Jordan and J. C. Annis
Natural Convection Cooling and Dehumidifying, by L. G. Seigel and W. L. Bryan
Stable Hot-Wire Anemometer for Low Speed Air, by J. F. Kemp, (by title only)

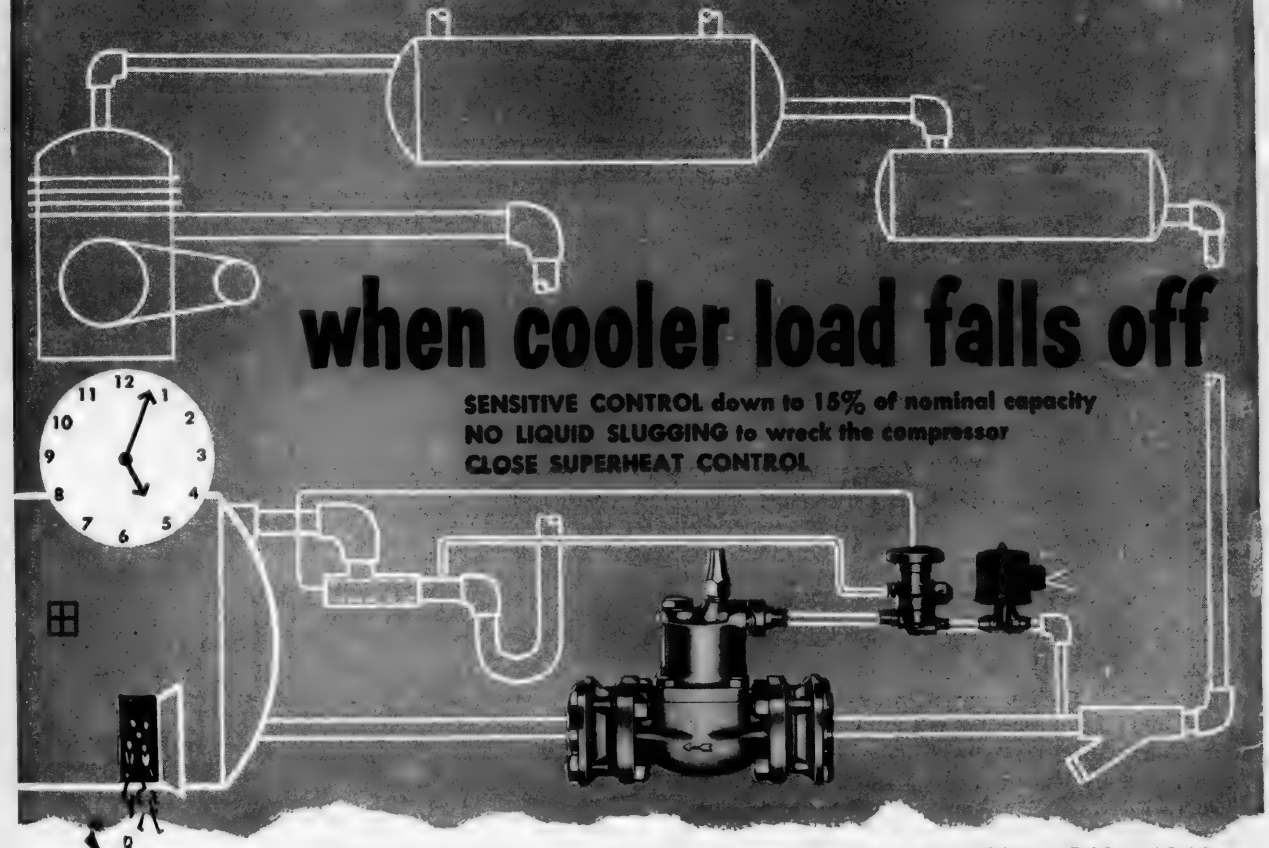
9:30 a.m. THIRD SESSION
SYMPOSIUM OF HIGH TEMPERATURE WATER
P. N. Vinther, *Moderator*
Economic Evaluation of High Temperature Water, by E. M. Thompson

(Concluded on page 130)



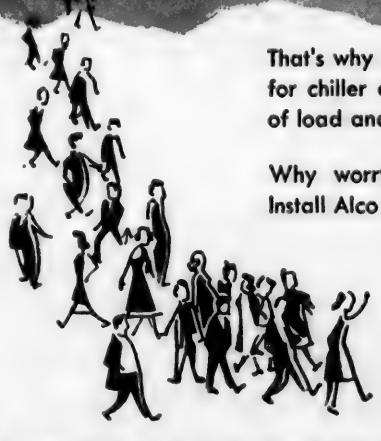
alco PO valve

maintains control



when cooler load falls off

SENSITIVE CONTROL down to 15% of nominal capacity
NO LIQUID SLUGGING to wreck the compressor
CLOSE SUPERHEAT CONTROL



That's why Alco is recommended so often for chiller applications with wide ranges of load and capacity.

Why worry about compressor failure? Install Alco and relax!

Capacities: 20 to 200 tons, F-12 and F-22

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The System Shows the Difference

Write for Bulletin No. 189-57

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SEE YOUR ALCO WHOLESALER

Marine Application of High Temperature Water, by S. W. Brown
Design of High Temperature Water Systems for Military Installations, by C. A. Carter and B. L. Sturdevant
Heating and Air Conditioning a Civilian Airport, by Charles Broder
British and European Design and Construction Methods, by George Applegate, Jr.

Wednesday — January 29

9:30 a.m. FOURTH SESSION
Effect of Heated Floor Temperatures on Comfort, by R. G. Nevins and A. O. Flinner
Lighting and Cooled Air Effects on Panel Cooling, by L. F. Schutrum and T. C. Min
Radiant Drafts from Cold Ceilings, by H. E. Ronge and B. E. Lofstedt

9:30 a.m. FIFTH SESSION
Local Climatic Weather Data, by W. L. Holladay
A Dynamic Heat Storage System, by T. L. Etherington
Improving Attic Space Insulating Values, by F. A. Joy

2:00 p.m. SIXTH SESSION
Chimney and Stack Design for Gas-Fired Equipment, by R. L. Stone
Pressure Losses and Flow Characteristics of Multiple-Leaf Dampers, by E. J. Brown and J. R. Fellows
Fan Noise Variation with Changing Fan Operation, by R. D. Madison and J. B. Graham

2:00 p.m. SEVENTH SESSION
SYMPOSIUM ON SCHOOL HEATING, VENTILATING AND AIR CONDITIONING
W. G. Hole, *Moderator*
Educator's View for Need for Good Classroom Environment, by G. B. Wadzeck
HV&AC Design Practice for Schools, by Henry Wright
Economics of School Heating and Air Conditioning, by Z. A. Marsh
State Board Problems—Financing and Others, by C. B. Hershey
Looking Into the Future, by E. G. Good

I-B-R SCHOOL

on hydronic heating and cooling to hold short courses throughout country stressing compatible cooling.

A new *how to* course in designing and installing hydronic systems will be given throughout the country in 1958 in 15 I-B-R Heating and Cooling Schools and 6 Short Courses, according to an announcement by the Institute of Boiler and Radiator Manufacturers.

The revised three-day course of study teaches labor and material saving methods that have been tested and proved to provide more business and bigger profits for contractors and wholesalers. A significant part of the course is devoted to cooling, with practical instruction in the calculation, design and, for the first time, installation of compatible cooling equipment. I-B-R Guides used as text books in the schools are new publications.

• **PROBLEMS SOLVED IN CLASS**—As in the past, design and calculation problems will be discussed and worked out in the classroom. Under the direction of Arthur Wales, I-B-R field training director, students will design systems for one-pipe forced hot water heating, series loop baseboard, combination heating and cooling, and independent chilled water cooling. Students will also analyze modern piping practices using the new Guide 700. Two other guides will be used for classroom practice in I-B-R's advanced, accurate method for calculating residential heat losses and cooling loads.

Although no engineering background or previous experience in the heating-cooling industry is required in order to receive full benefit from the I-B-R School, it offers equal value to experienced men who feel the need to be brought up-to-date on latest developments in the industry. All materials and texts used in the three-day course are included in the tuition of $36.00. Information may be obtained by writing the Institute at 608 Fifth Ave., New York 20, N. Y.

LP GAS SALES

total 6.6 billion gallons in 1956 for a gain of 8.4 per cent in one year, Bureau of Mines reports.

Combined domestic-commercial sales of LP gas rose 7.1% in 1956, Bureau of Mines reports. Over-all increase of 8.4% is accounted for by an increase of 18.7% for internal combustion use. Consumption was 6.6 billion gallons of propane, butane, and their mixtures. Over half of all sales is propane.

STATEMENT REQUIRED BY THE ACT OF AUGUST 24, 1912, AS AMENDED BY THE ACTS OF MARCH 3, 1933, AND JULY 2, 1946 (Title 39, United States Code, Section 233) SHOWING THE OWNERSHIP, MANAGEMENT, AND CIRCULATION OF "AIR CONDITIONING, HEATING AND VENTILATING" published monthly at East Stroudsburg, Pennsylvania for October 1, 1957.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:
Publisher, The Industrial Press, 93 Worth Street, New York 13, N. Y.
Editor, Clifford Strock, 93 Worth Street, New York 13, N. Y.
Managing editor, None.

Business managers: Robert B. Luchars, 93 Worth St., New York 13, N. Y.; Edgar A. Becker, 93 Worth St., New York 13, N. Y.; Harold L. Gray, 93 Worth St., New York 13, N. Y.

2. The owner is:
The Industrial Press, 93 Worth St., New York 13, N. Y.; Robert B. Luchars, 93 Worth St., New York 13, N. Y.; Edgar A. Becker, 93 Worth St., New York 13, N. Y.; Franklin D. Jones, 93 Worth St., New York 13, N. Y.; Walter E. Robinson, 93 Worth St., New York 13, N. Y.; Charles O. Herb, 93 Worth St., New York 13, N. Y.; Harold L. Gray, 93 Worth St., New York 13, N. Y.; Clifford Strock, 93 Worth St., New York 13, N. Y.; Suno E. Larson, 93 Worth St., New York 13, N. Y.; Helena E. Oberg, 65 - 82nd St., Brooklyn 9, N. Y.; Edgar L. Becker, Nominee for Nancy Jane Becker, Susan Louise Becker and Donald Louis Becker, 714 Wellington Rd., Ridgewood, N. J.; First National Bank of Montclair and Robert B. Luchars, Trustees (Beneficiaries Unknown), Upper Montclair, N. J.; First National Bank of Montclair and Leigh Roy Urban, Trustees (Beneficiaries Unknown), Upper Montclair, N. J.; First National Bank of Montclair and Kenneth D. Ketchum, Trustees (Beneficiaries Unknown), Upper Montclair, N. J.; David D. Ketchum, 38 Mill Road, Falmouth, Mass.; Lee W. Noyes, Guardian for Susan Yarnall Urban, Greensboro, Vt.; Lee W. Noyes, Trustee U/W of Robert L. Urban, Greensboro, Vt.; John T. Urban, 8 Craigie Circle, Cambridge 38, Mass.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are:

Charlotte B. Baldwin, 420 Clinton Ave., Brooklyn, N. Y.; Franklin D. Jones, 93 Worth St., New York 13, N. Y.; Robert B. Luchars, 93 Worth St., New York 13, N. Y.; Ann Pelletier, 116 Pinehurst Ave., New York 33, N. Y.; Elizabeth Y. Urban, 38 Lakeview Road, Asheville, N. C.; Helen L. Ketchum, 231 King St., Cohasset, Mass.; Wilbert A. Mitchell, 28 Harlow Road, Springfield, Vt.; Henry V. Oberg, 6825 Almansa St., Coral Gables, Fla.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

EDGAR A. BECKER, Business Manager
Sworn to and subscribed before me this 19th day of September, 1957.
ALEXANDER LOYKA
Notary Public, State of New York, No. 31-7611350. Qualified in Queens County. Commission expires March 30, 1958.

...whether you need 2 CIRCUITS or 2 DOZEN!

Buy SPORLAN REFRIGERANT DISTRIBUTORS for Peak Performance *regardless of Load or Evaporator Temperatures!*

Because Only Sporlan with its Famous Interchangeable Nozzle can offer you ALL THESE IMPORTANT ADVANTAGES

It is perfectly adaptable to all refrigerants. The nozzle is removeable for visual, air, or test wire inspection of each individual circuit at both the distributor and coil connection. The nozzle selection can be made at the factory or on the job. The coil manufacturer can stock coils with the distributor already attached and select the proper nozzle later for the conditions specified. The capacity can readily be varied on the job if the application changes or conditions are not as expected.

In addition, Sporlan Refrigerant Distributors offer flare, solder, or flange models with a large selection of number of outlets, circuit sizes and capacities. Brass or aluminum bodies are available for Refrigerants 12, 22 and Carrene 7. Steel or aluminum for Ammonia. They are adaptable to any standard thermostatic expansion valve and are available for high, medium, and low temperature use. They are ideal for OEM units or field built-up jobs. They permit final coil pressure leak test without damage to valve.

So... If you are a packaged unit or coil manufacturer, contractor or service engineer... The Sporlan Refrigerant Distributor, with over 15 years of Peak Performance Leadership, is the one for you!

Better still... Install the famous Sporlan combination of Catch-All, Solenoid Valve, and Thermostatic Expansion Valve along with it and get Peak Performance right down the line!

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PRECISELY as you want it

NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because... it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

Most reliable because... the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because... you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because... the apparatus is simple, parts are accessible, controls are trustworthy.

The cleanest because... no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

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BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher

HANDBOOK OF NOISE CONTROL

Noise is unwanted sound, and considerable study has been given to methods which would control the amount of unwanted sound. Although many articles have been published on this subject, this is the first time that a handbook has been made available.

A large group of experts was assigned to write the forty chapters in this handbook, with Dr. Cyril M. Harris, associate professor of electrical engineering, Columbia University, serving as editor. Many of the authors of chapters are with the Department of Defense, in either a civilian or military capacity.

Some of the chapters are listed in order to show the wide scope of the book:

Physical properties of noise; propagation of sound in the open air; the loudness of sounds; audiometric testing in industry; hearing loss resulting from noise exposure; effects of noise on speech and behavior; effects of vibration on man; principles of vibration control and isolation; vibration damping, vibration measurement; instruments for noise measurement; noise measuring techniques; acoustical materials; control of solid-borne noise in buildings; transmission of air-borne noise through walls and floors; acoustical filters and mufflers; systems considerations in noise control problems; gear and bearing noise, fan noise; noise in water and steam systems; heating and ventilating system noise; reduction of the noise of iron-core transformers and chokes; electric motor and generator noise; automobile noise; noise in rail transportation; aircraft noise sources; community noise; legal aspects of the aircraft noise problem; legal liability for loss of hearing; noise control requirements in building codes.

Handbook of Noise Control, edited by C. M. Harris. Semi-flexible binding, 6 x 9 inches. Published by McGraw-Hill Book Company, 330 W. 42nd St., New York 36, N. Y. Price, $16.50.

THERMODYNAMICS FOR CHEMICAL ENGINEERS

Recently published is the second edition of Thermodynamics for Chemical Engineers, by Harold C. Weber and Herman P. Meissner, both professors of chemical engineering, Massachusetts Institute of Technology. The authors have attempted to cover the subject of thermodynamics from the point of view of the engineer and the physical chemist.

Most of the material in the book has been in both the undergraduate and the first graduate courses at MIT during the past two years.

The second edition contains an expanded treatment of fluid flow, plus descriptive chapters on power cycles, engines, turbines and refrigerators.

Among the chapters included in this textbook are: First law of thermodynamics; equilibrium; properties of pure materials; open systems; heat capacities and heats of reaction; perfect gases; generalized PvT relations;

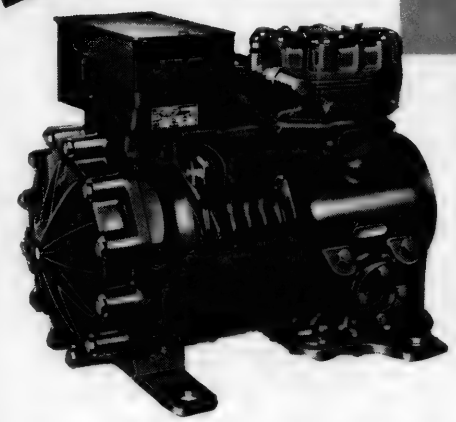
(Book Reviews concluded on page 134)

FIELD-PROVEN...RUGGED...QUIET...LOW-PRICED

ACCESSIBLE

4 H.P. and 5 H.P. COPELAMETIC

MOTOR-COMPRESSORS GIVE YOUR EQUIPMENT SUPERIOR PERFORMANCE



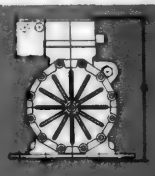
The hottest news yet in cooling! That's the best way to describe these latest achievements of Copeland research and development. They are just what the industry needs for the big residential and commercial market utilizing these sizes.

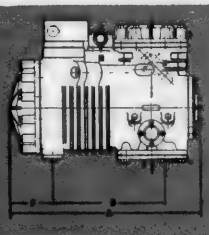
These new compact Copelametic motor-compressors will give all the long-time, carefree service traditionally engineered into every Copeland product. They're quiet, rugged, accessible. And, of course, they have been field-proven and are competitively priced. All single-phase models are inherent-protected—three-phase models available with external inherent-protectors.

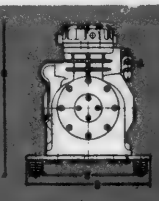
These motor-compressors are added evidence you can always count on Copeland.

SINCE 1918 **Copeland** REFRIGERATION CORPORATION, Sidney, Ohio

SPECIFICATIONS AND CAPACITY DATA







DIMENSIONS AND SHUT-OFF VALVES

Model	H.P.	A (Max.)	B (Max.)	C	D	E	F	G	H—Suct. SOV Tube O.D.	H—Suct. SOV Type	J—Discharge SOV Tube O.D.	J—Discharge SOV Type
LRH-400	4	19¾"	13"	16⅜"	11⅜"	11"	4⅜"	14⅜"	1⅛"	S	⅝"	S
LRG-500	5	19¾"	13"	16⅜"	11⅜"	11"	4⅜"	14⅜"	1⅛"	S	⅝"	S

COMPRESSOR DISPLACEMENT, REFRIGERANT, OIL CHARGE, WEIGHT

Model	H. P.	Cyls.	Bore	Stroke	CFH Disp. @ 1750 R.P.M.	Refrig.	Oil Recharge	WEIGHT Net	WEIGHT Shipping
LRH-400	4	2	2¼"	1¾"	698	R-22	5½ pt.	236#	253#
LRG-500	5	2	2¼"	1¾"	815	R-22	5½ pt.	236#	253#

CAPACITY DATA (BTU/HR.)

Model	Evap'g Temp.	Suct. Press.	DISCHARGE PRESSURE										
			170.1#	183.7#	197.9#	212.9#	228.7#	245.3#	262.8#	280.5#	298.3#	317.9#	338.0#	359.7#
			CONDENSING TEMPERATURE											
			90°F.	95°F.	100°F.	105°F.	110°F.	115°F.	120°F.	125°F.	130°F.	135°F.	140°F.	145°F.
LRH-400	45°F.	76.6#	68625	66500	64375	62000	59895	57750	55375	53000	50875	48250	45875	43625
LRG-500	45°F.	76.6#	78300	76000	73600	71500	69100	66900	64500	61900	59600	57500	55200	53000

you want 'em? we got 'em!

28 FULL LINES!

d-h AIR CONDITIONING

SPOTAIRE ROOM-by-ROOM AIR CONDITIONERS: #1 d-h LRC's: basic unit, concealed or deluxe cabinet; 4 models, 200 thru 600 cfm. #2 d-h VRC's: concealed or deluxe consoles; 3 models. 200 thru 600 cfm. #3 d-h HRC's: 3 suspended types, 19 models, 300 thru 1750 cfm.

AIR HANDLING UNITS: #4 d-h HH Series: ceiling suspended. #5 d-h HHV Series: floor mounted. Both: 14 models, 624 thru 28000 cfm.

VENTILATING UNITS: #6 d-h AM: 1752 thru 32250 cfm.

MULTIZONE TYPES: #7 d-h FLEXAZONE: for simultaneous, independent, variable heating, cooling, ventilating; 1752 thru 32250 cfm.

PACKAGED AIR CONDITIONERS: #8 d-h AECR: with built-in evaporative condenser. #9 d-h SCR: with water-cooled condenser. Both, 7½ thru 75 H.P.

PACKAGED STORE COOLERS: #10 d-h DYNA-PAC & ROYALAIRE: 2 thru 15 tons.

PACKAGED WATER CHILLERS: #11 d-h CWG: 7½ thru 75 H.P. #12 d-h CWG-E: attached evaporative condenser. Both 7½ thru 75 H.P.

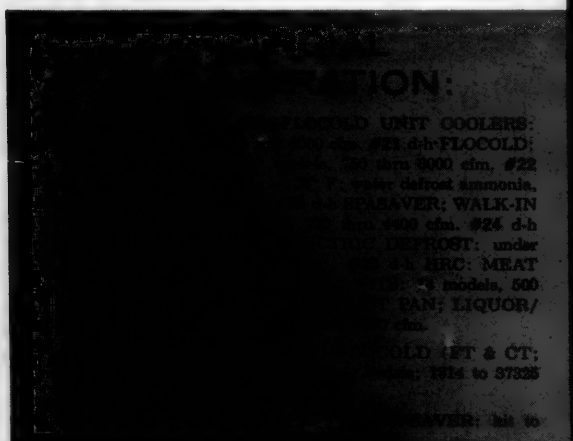
EVAPORATIVE CONDENSERS: #13 d-h PERMA-FAN: 13 models; 5 thru 110 tons.

COILS: #14 Extended surface; steam, water, DX #15 Type "H"; small applications, DX or chilled water.

PACKAGED WATER CHILLERS: #16 d-h AC; air cooled. #17 d-h WC: water cooled. Both, 2, 3, 5 H.P.

COOLING TOWERS: #18 d-h WMT: 13 models, 5 thru 100 tons.

AIR-COOLED CONDENSERS: #19 d-h ACC: 5 models, 2 thru 20 tons.



Want literature? Request by number: #1 thru #28

NAME

ADDRESS

drayer-hanson
DIVISION OF NATIONAL-U.S. RADIATOR CORP.
3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA
CABLE: FORTRADE LOS ANGELES

Book Reviews *(Concluded from page 132)*

the second law of thermodynamics; work functions; flow of fluids; engineering applications of fluid flow; power cycles; engines and turbines; refrigeration; homogeneous equilibrium; heterogeneous equilibrium; effect of temperature on chemical equilibrium; state properties; phase equilibrium in multicomponent systems.

Thermodynamics for Chemical Engineers, by H. C. Weber and H. P. Meissner. Cloth bound, 6 x 9 inches, 507 pages. Published by John Wiley & Sons, Inc., 440 4th Ave., New York 16, N. Y. Price, $8.50.

WHAT READERS SAY

Spray Booth Ventilation

EDITOR, AIR CONDITIONING, HEATING AND VENTILATING
Dear Sir:

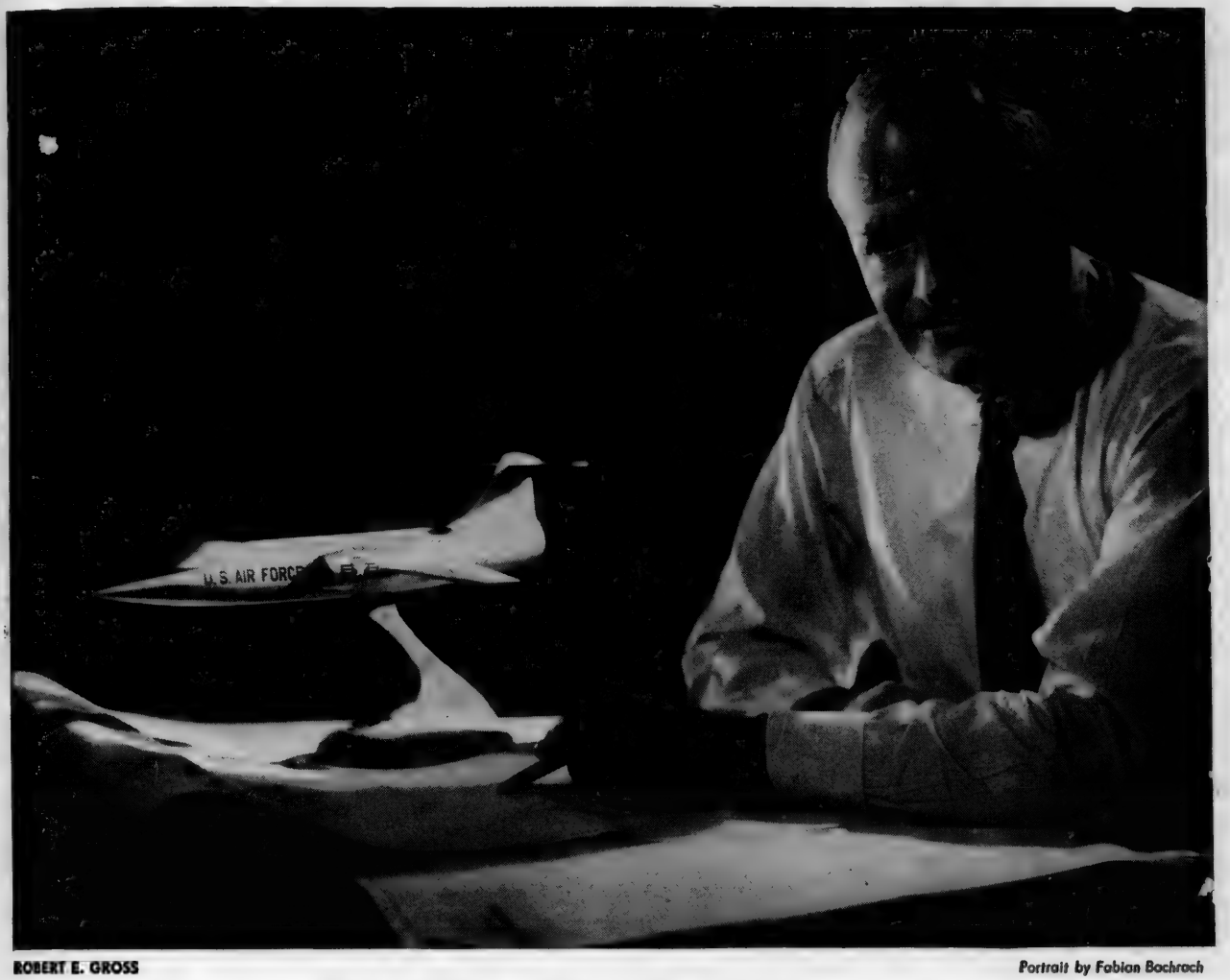
Congratulations to Mr. Marlow for his interesting and informative article on filter-type spray booths in your October issue.

The described system of an automatic pressure-actuated switch to shut off compressed-air supply to the spray gun when negative pressure downstream of the filters reaches a pre-set point, indicative of minimum control air flow into the booth, has merit, but lest this result in complacency that the problem of utilization, cleaning, and changing of filters is solved, I should like to comment additionally.

Since operation of this control system depends on fan operation, what is to insure that the fan is turned on before spray-painting is attempted? There are still workers to be considered, who may not notice that air movement into a booth is lacking, an absence of fan noise, or other signs which would tell them that the fan may not be turned on. If the electric power switch of the control system also controls fan operation, this factor is eliminated. But then we must keep in mind that an ill-functioning fan also could result in the control system being of no effect. With faulty fan operation, air flow could fall well below the minimum necessary for hygienic control (such as 100 feet per minute) without negative pressure downstream of the filters building up to the point necessary for actuation of the pressure switch and shutting off of the compressed-air supply. The amount of air flow through the booth in such a case would depend on the extent to which fan operation was defective and on the condition of the filters. When it is considered that faulty fan operation may be due to trouble in the fan itself, in the attached drive or motor, or in electrical wiring, it is seen that this factor is of importance.

An improved switch, as the author implies, would be one the operation of which depends more directly on air velocity, rather than on pressure differential. Such may yet be developed commercially, and utilize the action of a swinging vane in the air stream, or perhaps utilize the voltage generated in a thermocouple circuit between heated and unheated junctions placed in the air stream. This type of voltage, which depends on the cooling effect of the air stream and thus on its velocity, merely drives a meter in a heated-thermocouple anemometer;

(Concluded on page 136)



ROBERT E. GROSS

Portrait by Fabian Bachrach

34,500 Lockheed Employees Regularly Buy U.S. Savings Bonds

"We in the Lockheed Aircraft Corporation family are proud of our record of participation in the U.S. Treasury's Payroll Savings Plan.

"It is important . . . particularly in these times . . . for all Americans to support our nation's programs and policies in every way. I know of no better way than the regular purchase of Savings Bonds.

"Our records show Bond-buying employees are saving at the weekly rate of $165,000 . . . a yearly total of approximately $9,000,000.

"This thrift, practiced regularly, is a vital keystone in building family security. It also makes a significant contribution to stabilization of the purchasing power of the dollar and the prevention of inflation.

"Each of our new employees is given the opportunity to join his fellow workers in the Payroll Savings Plan. We feel this is an important step in insuring America's future security and prosperity."

ROBERT E. GROSS, ***Chief Executive Officer, Chairman of the Board, Lockheed Aircraft Corporation***

A simple person-to-person canvass that puts a Payroll Savings Application Blank in the hands of *every* employee is all you have to do to install the Payroll Savings Plan or build employee participation in your present plan. Your State Sales Director is ready to help you. Write today to Savings Bond Division, U.S. Treasury Department, Washington 25, D. C.

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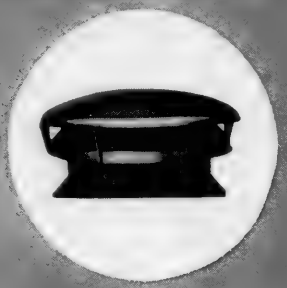
ROOF VENTILATION

Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.

NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.



POWERFUL "VD" for HIGH VELOCITY

By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

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. . . is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

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Three types of Allen turbines take full advantage of the economy of natural air movement.

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Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

ALLEN

ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, MICH.

Roof Ventilators for Every Commercial and Industrial Need
REPRESENTATIVES IN PRINCIPAL CITIES

(Concluded from page 134)

with amplification it probably could operate or control a solenoid valve in a compressed-air line. Preferably, this switch should act to keep the compressed-air supply open only in a specific range of air velocity, such as 100-150 feet per minute, rather than just above the minimum air velocity required for hygienic control. In this case, the compressed-air supply should be shut off if air velocity gets too low due to maximally dirty filters (or faulty fan operation), but also it should be shut off if air velocity gets too high, such as might occur if spray-painting were attempted (fan turned on) without the filters in place. The switch thus provides some assurance against spray-painting without filters, as well as against insufficient air flow. But even with this arrangement, there is not complete compensation (as far as cleaning the air of overspray is concerned) for filters that have accidentally been loosened or broken during spray-painting. Further, what is to prevent a hurried or obstinate worker from removing a filter or breaking a hole in one in an attempt to improve air flow and get his compressed-air supply back on?

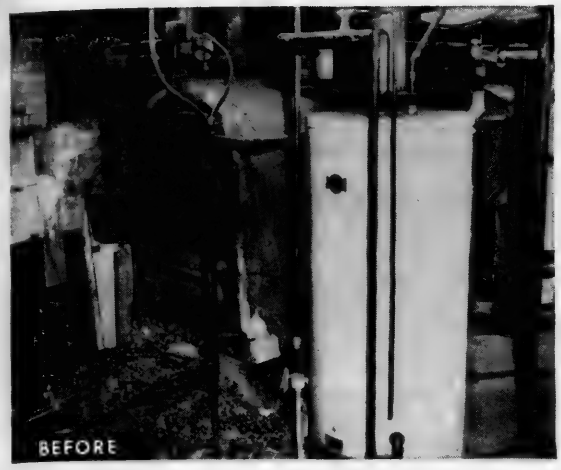
It seems that we have not gotten away completely from dependence on the human factor in this matter, and that perhaps the best answer is still a manometer or pressure gage indicating pressure drop across the filters, with the proper and safe range for spray-painting marked boldly on its scale—combined with education of the worker, supervision, and, last but not least, maintenance, whether in cleaning and changing filters, or in checking fan operation and control devices—which also may fail.

Institute of Industrial Health *Jerome K. Brasch*
University of Michigan

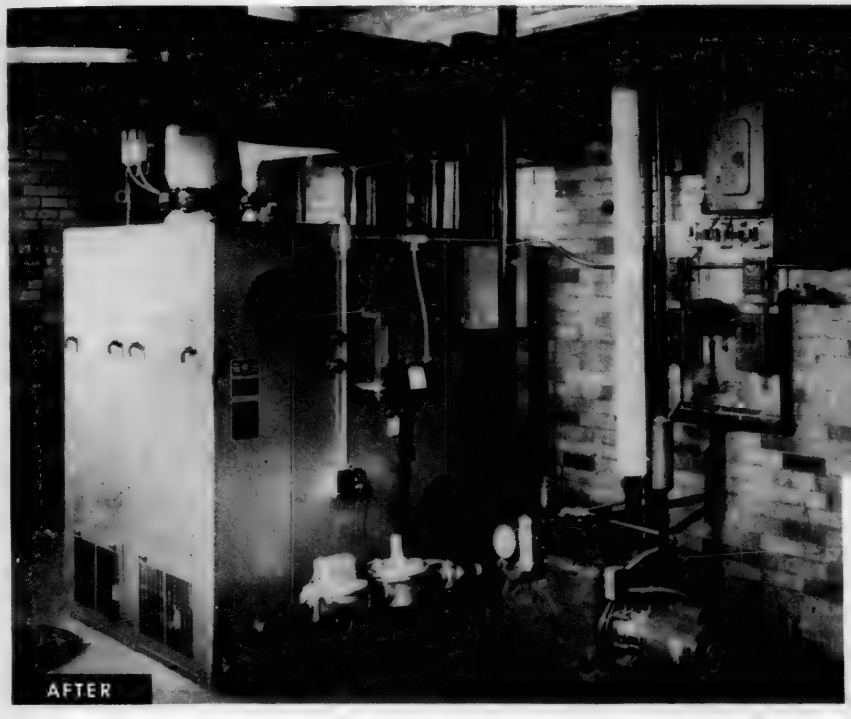
Canadian Degree-Days for October, 1957*

City	October		Cumulative	
	1957	Normal**	1957	Normal**
Calgary, Alta.	983	710	1308	1120
Charlottetown, P. E. I.	520	550	739	790
Crescent Valley, B. C.	746	680	1022	1010
Edmonton, Alta.	936	750	1230	1190
Fort William, Ont.	704	740	1122	1110
Grande Prairie, Alta.	1059	800	1375	1250
Halifax, N. S.	430	469	598	659
London, Ont.	548	490	739	640
Medicine Hat, Alta.	848	600	1092	900
Moncton, N. B.	566	590	814	850
Montreal, P. Q.	499	550	658	740
North Bay, Ont.	675	670	1007	990
Ottawa, Ont.	547	580	740	780
Penticton, B. C.	607	520	742	720
Prince George, B. C.	910	750	1262	1210
Quebec City, P. Q.	587	650	865	940
Regina, Sask.	918	750	1281	1120
St. John, N. B.	536	590	816	950
Saskatoon, Sask.	892	760	1245	1140
Timmins, Ont.	752	780	1208	1190
Toronto, Ont.	458	465	598	619
Vancouver, B. C.	488	440	633	660
Victoria, B. C.	458	410	622	640
Windsor, Ont.	469	410	607	530
Winnipeg, Man.	644	686	1025	997

* These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.
** New normal figures covering 30-year period, 1921 to 1950.
The Department reports slight revisions in the figures for September, as published in last month's issue. Corrected figures are: Calgary, Alta., 325; Edmonton, Alta., 294; Fort William, Ont., 418; Moncton, N. B., 248; Montreal, P. Q., 159; North Bay, Ont., 332; Ottawa, Ont., 193; Prince George, B. C., 352; Quebec, P. Q., 278; Regina, Sask., 363; Vancouver, B. C., 145; Victoria, B. C., 164.



WHY WAS A WEIL-McLAIN TYPE J GAS FIRED BOILER selected for this modernizing installation?



HEATING CONTRACTOR:
Holwerda Huizinga, Grand Rapids, Michigan

DISTRIBUTOR:
Richards Mfg. Co., Grand Rapids, Michigan

The photos above tell part of the story, without need for further comment.

What they don't show are the built-in "Extra Values" which make the Weil-McLain Type "J" Gas Boiler an outstanding automatic heat producer.

This sectional *cast iron* boiler is distinguished by a long list of features which enable it to perform economically, year after year. Note its space saving compactness—particularly the low head room required. Assembly with short, multiple draw-rods shortens erection time—assures a strain-free boiler. Its handsome jacket is completely insulated.

Now available for use with the Weil-McLain Type "J" Boiler is a new pre-wired, electronic control panel which cuts installation time and assures correct boiler operation. New "Easy-Fit" Headers, machined and pre-fitted at the factory, are also available to provide all the advantages of a swing header without added erection costs.

WEIL-McLAIN BOILERS · RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address literature requests to Dept. BB-127

Jackson & Church furnaces

solve difficult heating problems of new Crown Cork and Seal plant —

INSTALLATION DATA

PLACE:
New lithograph plant of Crown Cork & Seal Company's Can Division, Philadelphia, operating five of the latest litho presses and five coaters and ovens

REQUIREMENTS:
Dependable heating designed to supply large volume of fresh outside air replacing oxygen consumed by lithograph equipment. Summer air conditioning to utilize same ducts and fans

HEATING UNITS SPECIFIED:
Three JACKSON & CHURCH GA-4750 units, having a total air delivery of 120,000 C.F.M. and 14,250,000 Btu input

MANUFACTURER:
JACKSON & CHURCH - Div. of YORK-SHIPLEY, INC. York, Pa. (J-C furnaces - America's largest & most complete warm air heating line)

DISTRIBUTOR:
Furnace Distributors, Inc. Philadelphia, Pa.

INSTALLER: Consolidated Air Conditioning

Modern facade of Crown Cork & Seal Company's new plant in Philadelphia.

J-C JACKSON & CHURCH
Division of
YORK-SHIPLEY, INC.
P.O. BOX 349, YORK, PENNSYLVANIA

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

AUTOMOTIVE ENGINEERS MEETING—Annual meeting and engineering display of the Society of Automotive Engineers, Inc., at The Sheraton-Cadillac and Statler Hotels, Detroit, Mich. J. A. C. Warner, secretary of the Society, 485 Lexington Ave., New York 17, N. Y. ..... **JANUARY 13-17, 1958.**

HOME BUILDERS EXPOSITION—14th annual convention-exposition of the National Association of Home Builders of the United States, at the Conrad Hilton and Sherman hotels, and the Chicago Coliseum, Chicago. Secretary of the Association, 111 W. Jackson Blv'd., Chicago 4, Ill. ..... **JANUARY 19-23, 1958.**

ASHAE WINTER MEETING — 64th annual meeting, American Society of Heating and Air-Conditioning Engineers at the Penn Sheraton Hotel, Pittsburgh, Pa. A. V. Hutchinson, secretary ASHAE, 62 Worth St., New York, N. Y. ..... **JANUARY 27-29, 1958.**

METEOROLOGICAL MEETING—163rd National Meeting of the American Meteorological Society, including the 38th annual business meeting, at the Barbizon-Plaza Hotel, New York, N. Y. K. C. Spengler, executive secretary of the Society, 3 Joy St., Boston 8, Mass. ..... **JANUARY 27-30, 1958.**

PLASTICS SOCIETY CONFERENCE—13th annual Technical and Management conference and Industry Exhibit of the Reinforced Plastics Division of The Society of the Plastics Industry, Inc., at the Edgewater Beach Hotel, Chicago, Ill. Morrison-Gottlieb, public relations, 565 Fifth Ave., New York 17, N. Y. ... **FEBRUARY 4-6, 1958.**

INDUSTRIAL VENTILATION CONFERENCE—7th annual Industrial Ventilation Conference, sponsored by the Michigan Department of Health, and the Department of Mechanical Engineering and Continuing Education Service of Michigan State University to be held at Kellogg Center, Michigan State University. Chairman of the Conference, Continuing Education Service, Michigan State University, East Lansing, Mich. ..... **FEBRUARY 17-20, 1958.**

NACE CONFERENCE—14th annual conference of the National Association of Corrosion Engineers, at the Civic Auditorium, San Francisco, Calif. A. B. Campbell, executive secretary of the Association, 1061 M & M Bldg., Houston 2, Texas. **MARCH 17-21, 1958.**

NUCLEAR CONGRESS—1958 Nuclear Engineering and Science Conference in Chicago, Ill. Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. ..... **MARCH 17-21, 1958.**

POWER CONFERENCE—20th anniversary meeting of the American Power Conference, at the Hotel Sherman, Chicago, Ill. R. A. Budenholzer, mechanical engineering department, Illinois Institute of Technology, 3300 Federal St., Chicago 16, Ill. .. **MARCH 26-28, 1958.**

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturer's Association, at The Greenbrier, White Sulphur Springs, W. Va. Secretary of the Association, 60 E. 42nd St., New York 17, N. Y. ..... **MARCH 31-APRIL 2, 1958.**

AIR-CONDITIONING AND REFRIGERATION MEETING—Annual meeting of the Air-Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Secretary of the Institute, 1346 Connecticut Ave., N.W., Washington 6, D. C. ..... **MAY 4-7, 1958.**

NDHA CONVENTION—49th annual meeting of the National District Heating Association, at the French Lick-Sheraton, French Lick, Inc., J. F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. ..... **JUNE 2-6, 1958.**

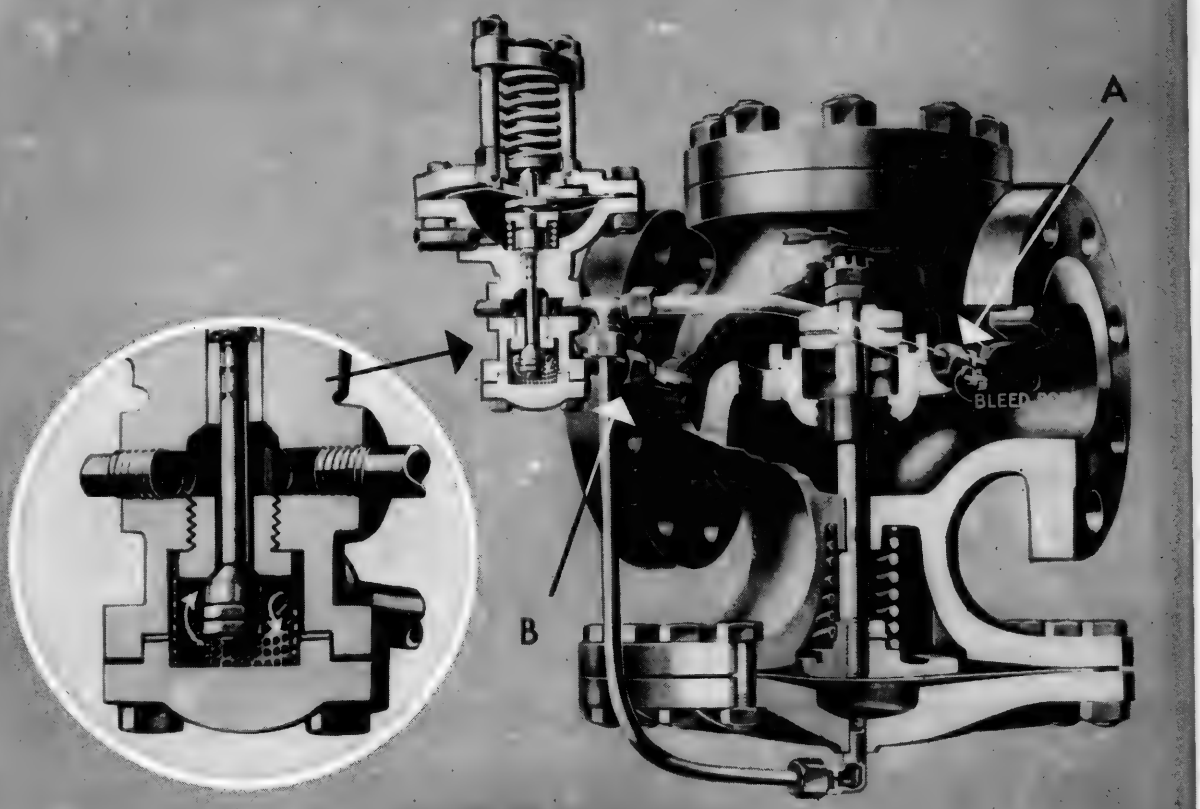
ASTM MEETING—Annual meeting of the American Society for Testing Materials, at the Hotel Statler, Boston, Mass. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. .. **JUNE 22-27, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society of Heating and Air-Conditioning Engineers and American Society of Refrigerating Engineers. Hotel Leamington, Minneapolis, Minn. A. V. Hutchinson, secretary of the ASHAE, 62 Worth St., New York 13, N. Y., and Secretary of the ASRE, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society of Heating and Air-Conditioning Engineers (Jan. 26-29, 1959) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. .. **JANUARY 26-30, 1959.**

VALVE TIPS:

Advantages of External Pilots in Automatic Regulating Valves



Spence Type ED Pressure Regulator

"Maintenance-free, trouble-free, install-and-forget." They're all pretty phrases, but every engineer knows from experience they don't apply to regulating valves. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines.

One advantage of the external pilot mounting shown above is simplified maintenance. Trouble shooting is faster, downtime is reduced, and tempers don't take such a beating. Here's why:

If trouble develops, it's easy to find out if it's in the pilot or the main valve. Just remove the tubing bend at A. A simple test, without any instruments or other equipment, shows where the trouble is.

If the trouble is in the pilot, you can remove it by disconnecting the unions at B. There's no need to take the main valve out of the line.

The quickest way to get the regulator functioning again is to install a spare pilot. This is easy — and in the Spence design it's not expensive to carry spare pilots. Spence pilots fit all sizes of Spence main valves. There's no need to stock an expensive inventory of pilots for each main valve size.

In the enlarged sectional drawing above, you can see how the strainer, seat and disc of the pilot are readily accessible by removing the blind flange.

If the trouble is in the main valve, here again inspection is easy. If there's dirt in the steam line, it may clog the bleed port or restriction orifices. In the Spence design these can be inspected and cleaned by merely removing the tubing connections. The seat and disc of the main valve can also be inspected easily by removing the top flange.

These maintenance advantages, plus other advanced design features, are available for a wide range of regulating applications. For information on Spence's wide range of different automatic regulating valves, write for your copy of Bulletin 1005.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

Which of these ventilation problems do you want solved?

General ventilation and comfort cooling? Removal of fumes, dust, heat and steam? Air circulation, rapid product cooling and drying?

Power Line

solves it these 5 ways surer:

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of dust resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 63.

POWER LINE FAN COMPANY, INC.

Subsidiary of **Chelsea Products, Incorporated** 639 South Avenue, Plainfield, New Jersey

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ZEOLITE WATER SOFTENERS — Features of zeolite water softeners which assure efficient, dependable, and easy operation are described in Bulletin 20B7107A released by Allis-Chalmers Mfg. Co., Milwaukee, Wis. The bulletin explains how the company's standard units in sizes to 120-inch dia can be easily adapted to meet individual plant requirements where the applications involve elimination of costly maintenance due to scaling of boilers; pipes and heat exchange tubes; the production of satisfactory water for hospitals, institutions and hotels; and special water problems.

Circle **Item 58** on Inquiry Card

TUBES AT HIGH PRESSURE—Use of tubular products at elevated temperatures and pressures is discussed in Bulletin TDC-153B, issued by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. This 4-page folder presents the stress rupture data on a number of tubing steels used in such services. The card furnishes results of stress rupture tests on 14 steels including carbon steel, several alloy steels, and 10 different stainless steels. Testing temperatures range from 850 deg F through 1800 deg F.

Circle **Item 59** on Inquiry Card

STEAM HEATING COILS—Bulletin B-1418 describes Type D-1 double-tube steam distributing coils available from American Blower Div. of American-Standard, Detroit, Mich. A 2-page section on selection data includes tables on final air temperature and temperature rise correction factors. Air friction tables and piping instructions, complete with typical piping diagrams, are also listed.

Circle **Item 60** on Inquiry Card

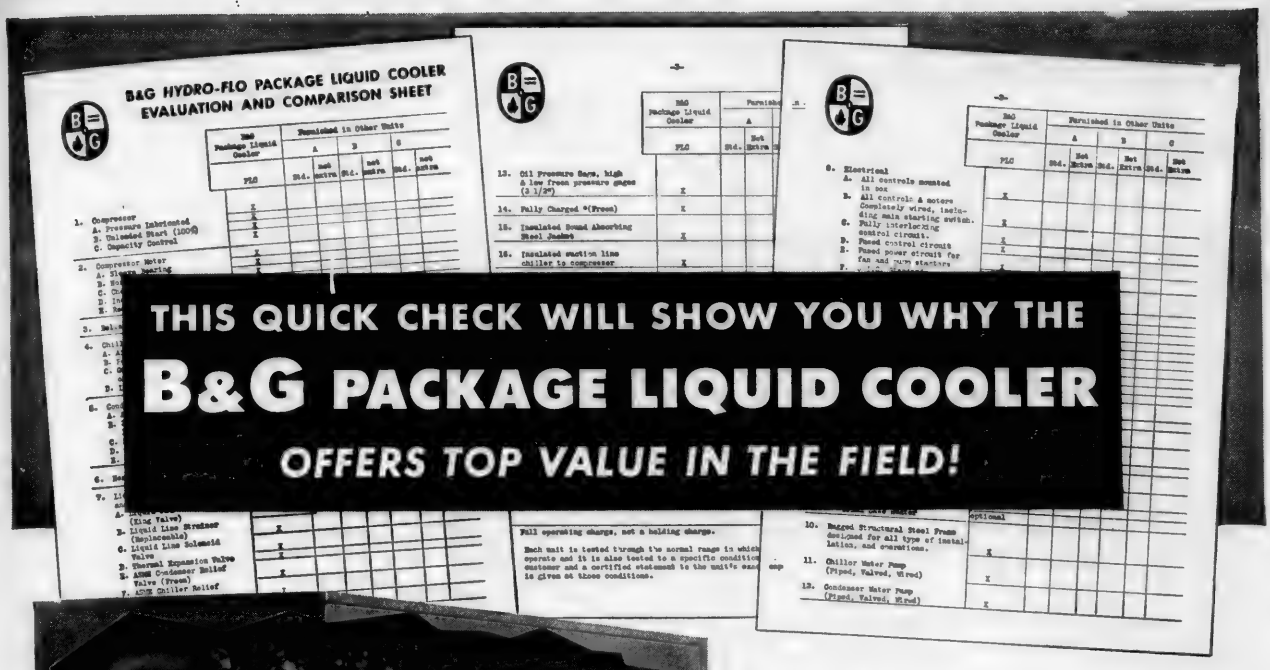
AIR HUMIDIFIERS AND FILTERS — Published by Research Products Corp., Madison, Wis., is 8-page Form 1442 describing and illustrating the company's lines of industrial humidifiers, multi-velocity air filters, and paint arrestors for spray booth exhaust systems. Residential humidifiers and air filters are also described briefly.

Circle **Item 61** on Inquiry Card

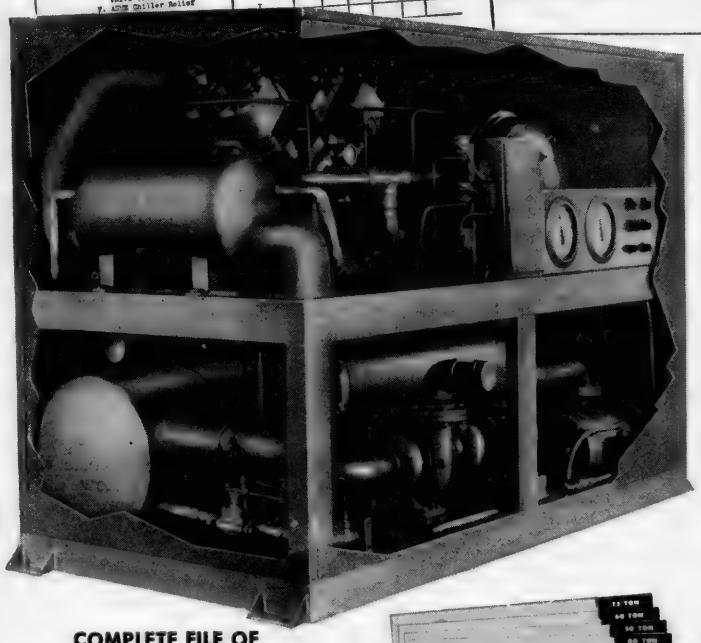
RETURN AIR VENT SILENCERS—Literature describing the company's Quiet-Vent silencer is available from the Air Conditioning Department of Industrial Acoustics Co., Inc., New York, N. Y. The silencers are designed to prevent the transmission of noise through return air vents without impeding the passage of air.

Circle **Item 62** on Inquiry Card

(Continued on page 142)



THIS QUICK CHECK WILL SHOW YOU WHY THE B&G PACKAGE LIQUID COOLER OFFERS TOP VALUE IN THE FIELD!



Send for a set of Evaluation Charts as illustrated above—compare the *standard* equipment of the B&G Package Liquid Cooler with that of any other. You'll see for yourself that *you can buy B&G quality at smaller installed cost!*

With this *completely packaged* unit, costs which might otherwise be charged against the job are eliminated. For example—

No inside wiring costs. The finest electrical controls are furnished, *completely wired and fully interlocked!*

No inside piping costs. Both chiller and condenser pumps are sized to specification, mounted, piped and electrically interlocked.

No structural framing costs. All equipment is mounted on a rugged steel frame—a permanent base.

No metal forming costs. Standard equipment includes a heavy gauge steel jacket with sound-deadening undercoating and Hammerloid finish.

No insulating costs. The suction line and heat exchanger are fully insulated.

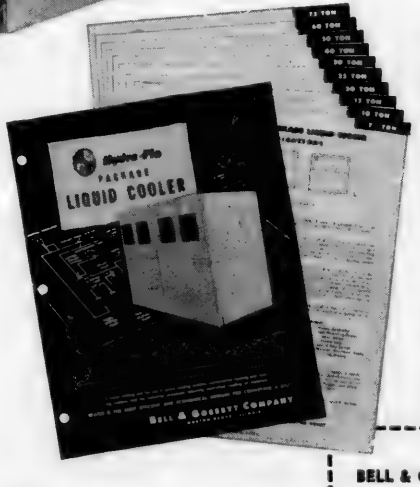
No testing costs. Fully tested under specified operating conditions and also under varying load conditions. All valves adjusted and balanced.

No extras to buy. Standard equipment includes gauges, compressor motor, all belts, driving sheave, compressor fly wheel, increment start, full sized heat exchanger and full operating charge of Freon.

Capacities: Ten units from 7½ to 75 tons

COMPLETE FILE OF SPECIFICATION AND APPLICATION DATA

Engineering data, specifications, evaluation charts, typical applications and prices on the B&G Package Liquid Cooler are included in this file. Send the coupon for your set.



BELL & GOSSETT COMPANY

Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

BELL & GOSSETT COMPANY, Dept. RFB-4, Morton Grove, Illinois
Please send complete file of data on B&G Package Liquid Coolers.

*Name*_____

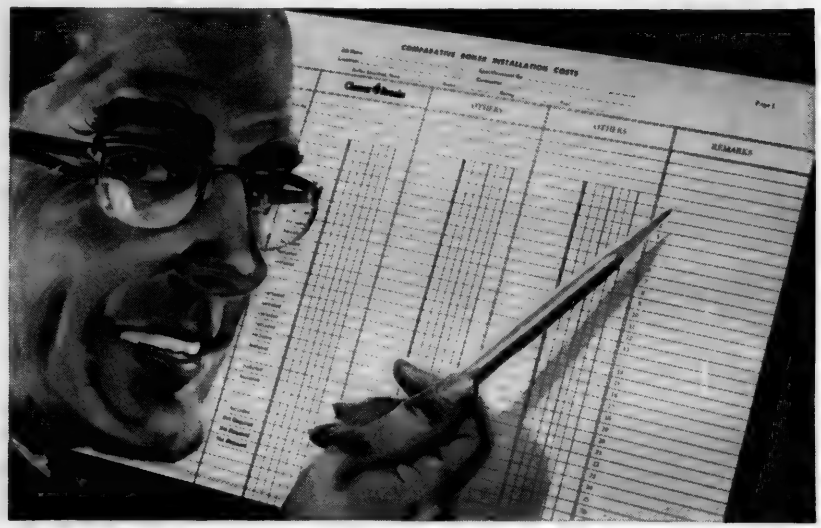
*Firm Name*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

Before you buy any boiler

compare quoted prices with REAL COSTS



New Cleaver-Brooks cost analyzer clears "quotation" confusion — reveals ALL costs

Get *all* the costs . . . the *real* costs . . . down on paper before you recommend or specify a boiler to your clients. On many boiler installations "quoted prices" seldom agree with the total costs, as you may have learned. This is frequently the case with so-called "built-up" boilers assembled on the site.

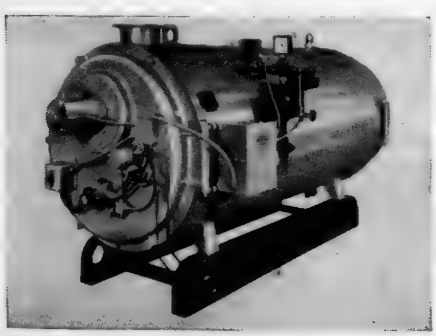
Cleaver-Brooks' cost analysis enables you to compare all material costs (boiler, steam trim, burner, refractory, controls and other equipment) and installation labor costs. You'll know the "real costs" on the complete installation before you start.

Real eye-opener

The figures you'll see may be startling. In most cases the cost analysis proves a Cleaver-Brooks costs *less*. On-job time is drastically reduced because Cleaver-Brooks packaged units are fully assembled, ready to install. Cleaver-Brooks boilers give you more in performance, too . . . each boiler is fully fire-tested at the factory under load, tuned to peak economy. Starting service and on-the-job operator training by authorized field engineers further decreases your over-all costs.

Contact your Cleaver-Brooks agent

Once you add up all the benefits of a Cleaver-Brooks "one-cost" package . . . the proved trouble-free economy of exclusive four-pass, forced-draft design, you'll find it pays over and over to analyze costs carefully before you buy. See your Cleaver-Brooks agent for details or write Cleaver-Brooks Company, 315 East Keefe Ave., Milwaukee 12, Wisconsin, Dept. P.



Choose from 19 sizes, 130 models, 15 to 600 hp. Oil, gas and combination oil/gas fired — steam or hot water for heating or processing.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

NEW CATALOGS

(Continued from page 140)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

FILMS AND PUBLICATIONS—Available from Air Reduction Sales Co., a division of Air Reduction Co., Inc., New York, N. Y., is a booklet, Publications and Audio Visual List. The booklet briefly describes many of the Airco publications and audio visual items which may be had, except for the hard-cover instruction texts, without charge. The publications cover various applications of industrial gases, and welding and cutting techniques and equipment. The motion pictures, for showing to audiences represented by companies, schools, business groups, and other interested organizations, depict the latest developments in automatic welding, machine gas cutting, and other processes.

Circle **Item 63** on Inquiry Card

LIQUID LEVEL, FLOW CONTROLS — Available from Magnetrol, Inc., Chicago, Ill., is The Power Plant of Tomorrow, a 10-page booklet describing in detail the use of the company's liquid level and flow controls at the experimental boiling water reactor, Argonne National Laboratories, Lemont, Ill. While the book is devoted to the atomic power plant, the level control applications are such as are encountered in any industry, regardless of the end product involved. Actual photographs from inside the reactor and a simplified flow diagram explain complete function of each of the 16 Magnetrols installed as safety controls.

Circle **Item 64** on Inquiry Card

2-WIRE SUBMERSIBLE PUMPS — Rapidayton Division of the Tait Manufacturing Co., Dayton, Ohio, has issued a catalog (No. 906) devoted to the line of new 2-wire Dolphin submersible pumps and water systems for 4-inch or larger wells. Models are listed in sizes ranging from ½ through 1 hp, capable of reaching depths to 360 ft and delivering up to 2400 gph. These 2-wire models are greatly simplified in design, and require no control box.

Circle **Item 65** on Inquiry Card

MODERNIZED POWER GROOVERS — Its line of Giant power grooving machines, equipped with pushbutton controls and gearhead motor drive, is described in Bulletin 76D, recently revised by Niagara Machine & Tool Works, Buffalo, N. Y. Full details and specifications are included along with step-by-step illustrations of single and Pittsburgh lock seaming.

Circle **Item 66** on Inquiry Card

(Continued on page 144)

HARRIS FLOATS

STAINLESS STEEL FLOATS

If you have a liquid level control operating under high pressure or high temperature, or in a corrosive liquid, be sure to specify Harris Type 304 Stainless Steel Floats. The inherent strength of stainless steel makes them ideal for this purpose, and all that strength has been retained with the Harris Atomic Hydrogen welding process that produces a smooth, uniformly strong and ductile weld without oxidation.

Where corrosion is more severe Harris recommends its Type 316 Stainless Steel Floats.

Take advantage of Harris' half century of float experience and consult us on any float problem.

Write for Harris Catalog with technical float data.

ARTHUR HARRIS & CO.
206 No. Aberdeen Street, Chicago 7, Illinois

Petrometer

SERIES 1400

LIQUID DEPTH GAUGES

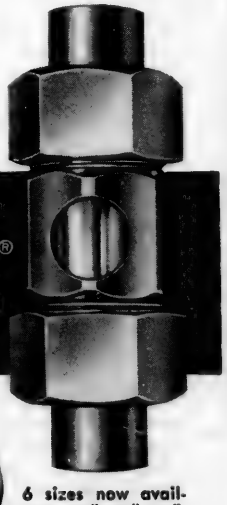
ACCURATE and EASY TO INSTALL

Available in 4 Models, Petrometer Series 1400 Tank Gauges operate on the sound principle of hydrostatic pressure. No moving parts, no expensive electrical or electronic equipment. Large vertical scale gives accurate, easy-to-see reading. And construction features make installation easy.

For complete information send for Bulletin 6004

Build Your Own Panels with Easy-to-Assemble Petrometer Parts

PROVED ON THOUSANDS OF PRODUCTION LINE INSTALLATIONS!



"250" SERIES

LIQUID EYE®

POSITIVE SEALING INDICATORS

designed to save you even more time and money

DESIGN FEATURE

extension-gasket . . . ALL ONE-PIECE!
A built-in gasket that's always in place for positive sealing and foolproof assembly.

6 sizes now available: ⅜", ½", ⅝", ⅞", 1⅛" and 1⅜" O.D.S.

The "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:

- **smaller—more compact, simplified design.**
- **preformed copper extension eliminates need for separate gaskets—*foolproof* installation.**
- **complete, self-contained, economy unit.**

Write today for catalog E-57 covering the complete Allin line.

Allin

ALLIN MANUFACTURING CO.
410 N. Hermitage Ave. • Chicago 22, Illinois
Over 1,000,000 Liquid Eyes Sold to Date!

Measure Specific Gravity Accurately!

. . . and from a remote point

The Petrometer remote reading Specific Gravity Indicator is accurate to .001 Sp. G. unit, with interpolation to .0005 unit! It's easy to install . . . and operates on the simple, sound principle of a differential bubbler.

An ideal instrument for plant or laboratory for measuring specific gravity of any liquid . . . paints, fuel, resins, pharmaceuticals, chemical solutions.

All functional parts are conveniently mounted on rear of panel, accessible by swinging open the cabinet door.

Send for Bulletin 7004

Petrometer CORPORATION
43-22 TENTH STREET, LONG ISLAND CITY 1, N. Y.

Low Silhouette cooling tower out of sight at street level

"Man-high" Binks 3-B series cooling towers let you make installations that are out-of-sight at street level. Maximum heights range from 6′ to 7½′ through the entire selection of frame sizes. Because of their low silhouette, 3-B cooling towers help preserve the clean architectural lines found in today's modern buildings.

Complete operation flexibility and capacity selection. There are 24 different cooling towers in Binks 3-B series—a wide range of refrigeration capacities. Individually powered blowers on multiple blower towers permit complete operation flexibility for most efficient cooling under varying load and weather conditions.

Whisper-quiet operation. Binks 3-B cooling towers operate so quietly they give you complete freedom in establishing their location. Put them adjacent to windows or in building wells, with complete confidence that they will disturb no one. The squirrel cage blowers have only 1/3 the tip speed of equal capacity propeller fan units. Dynamic and static balancing also insure vibrationless operation.

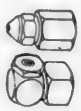
Minimum maintenance. Blowers and motors are outside the tower—not in the moisture laden air stream. All panels are heavily galvanized. Outsides of towers have two coats of aluminum paint. The insides are protected by a durable zinc chromate coating.

Send for complete data. Ask your Binks Branch Office, or write direct for a copy of Bulletin 477-A and 333. Binks engineers will be glad to answer your questions and help solve your particular cooling problems. There is no obligation.

7802

Binks

EVERYTHING FOR WATER COOLING



A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company

3120-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

NEW CATALOGS

(Continued from page 142)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

FLOAT-THERMOSTATIC STEAM TRAP— Simplified construction increases the accessibility of Type FT float-thermostatic steam trap, described in Bulletin No. 455-B from Sarco Company, Inc., New York, N. Y. Bulletin gives sizes and capacities of trap, and illustrates how entire operating element can be removed as one unit from trap body without disturbing inlet and outlet connections.

Circle **Item 67** on Inquiry Card

TWO-PERSON WASHFOUNTAINS — Entitled The Greatest Advance in Modern Sanitary Wash Fixtures, Bulletin K-1204 from Bradley Washfountain Co., Milwaukee, Wis., describes in detail the company's newly designed Duo-Washfountains. Features described and illustrated include easy wall mounting, the absence of scuff base to provide floor clearance, and the wide, hinged foot-treadle which controls water supply from the sprayhead.

Circle **Item 68** on Inquiry Card

UNDERFLOOR HEATING DUCT — A completely revised eight-page manual, describing and illustrating Ceramiduct, the low-cost heating duct material for radial and perimeter heating, has been published by the Straitsville Brick Co., New Straitsville, Ohio. This manual includes information on the new angle-cut Ceramiduct with detailed specifications and installation plans, including floor heat loss factor, duct size needed, and minimum register free area required for buildings.

Circle **Item 69** on Inquiry Card

UNDERGROUND PIPE INSULATIONS — The latest issue of "Pipe Insulation News" is offered by American Gilsonite Co., Salt Lake City, Utah. Pages 1-3 contain a detailed report in words and pictures on company's hot pipe insulations: in mineral form, its blending, and manufacture.

Circle **Item 70** on Inquiry Card

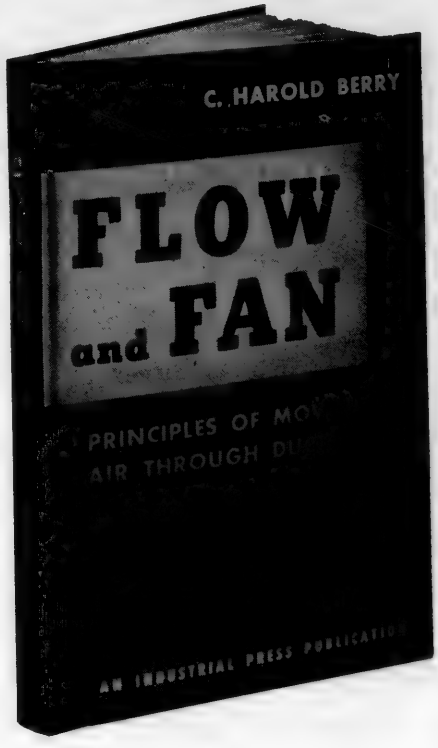
FUEL OIL TREATMENT — The advantages of sludge disintegration and dispersal in storage tanks and equipment is the subject of a new bulletin, FO-157, on fuel oil treatment, published by The North American Mogul Products Co., Cleveland, Ohio. Treatment is described which dissolves sludge into combustible material and emulsifies condensate water as a protection against rust and corrosion. Full company services and additional benefits are outlined.

Circle **Item 71** on Inquiry Card

(Continued on page 146)

To help you solve your problems . . .

A BASIC TEXT ON AIR HANDLING



Eminently readable!

Practical!

Comprehensive!

"Flow and Fan" will help you solve your problems of moving air through ducts, and the selection and control of fans. It covers the *how* and *why* behind the basic calculations in the design of systems, giving information that is applicable to the actual problems you meet in ventilating work.

The title is derived from the two major divisions of the book: the *flow* of gas through duct systems, and *fan* performance and control. Seven chapters on gas flow give the basic data you need and describe the methods used for calculating system resistance. The final six chapters are devoted to information that will help you in the practical task of selecting a fan for a given duty. Because of this treatment, "Flow and Fan" will meet the needs of students who are interested in acquiring a working knowledge of ventilation, and will be useful to practicing engineers as well.

The author possesses both engineering and teaching experience; and in addition he has the rare ability to write entertainingly about a technical subject without over simplification, but with practical attention to the limits of engineering accuracy.

If you are concerned with problems involving the moving of air through ducts and the selection and control of fans, you will find in "Flow and Fan" a wealth of basic information. Send for a copy of this book today. Pay for it only after you have read it, and used it, and seen for yourself how helpful it can be in your work or studies. Just mail the convenient coupon and "Flow and Fan" will be sent you immediately.

TWELVE FACT-FILLED CHAPTERS!

- Factors in Gas Flow Measurement
- Pressure and Loss Calculations
- Losses in Straight Uniform Ducts
- Losses in Diverging Passages
- Losses in Converging Flow
- The System Considered as a Whole
- Fan Performance
- Effect of Variables on Fan Performance
- Fan and System
- Selecting a Fan
- Fan Selection and Rating
- Fan Operation and Control

232 Pages
84 Illustrations

$4.00

In Canada or overseas, $4.70

Note Five-Day Free Examination Offer explained in coupon.

THE INDUSTRIAL PRESS, 93 Worth St., New York 13, N. Y.

Please send me a copy of "Flow and Fan."

☐ Check or money order enclosed. Send book postpaid.

☐ Send book and invoice, including postage. I will pay within five days if I decide to keep the book.

☐ Bill me ☐ Bill Company

Name .....

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City ..... Zone ..... State .....

Home Address .....

(Please fill in if you want book sent to your home)

12/57

DOUBLE MECHANICAL SHAFT SEALS

PERMANENTLY LUBRICATED BALL BEARINGS

These two advanced features of

DMV-DHV PUMPS

end pump maintenance problems

Used in place of conventional packed stuffing boxes, Double Shaft Seals eliminate the need for periodic inspections and repackings. Performance-proved and self-adjusting, they require no attention throughout their entire service life.

Sealed, Cartridge-Type Ball Bearings do away with the necessity of greasing or oiling pump bearings. Here, in the DMV-DHV pump, the bearing lubricant is permanently sealed in—and assures years of successful operation.

You can install this modern I-R pump anywhere due to the greater compactness obtained with this modern construction. It is the simplest, most maintenance-free pump ever built by Ingersoll-Rand for general hydraulic service. Write for Bulletin 7248-A, or see your nearest I-R branch office.

Single-stage, double suction DMV-DHV general hydraulic pumps are available for heads to 350 ft., capacities from 275 to 2400 gpm.

Ingersoll-Rand

10-288 Cameron Pump Division
11 Broadway, New York 4, N. Y.

PUMPS • CONDENSERS • TURBO-BLOWERS • COMPRESSORS • ROCK DRILLS
DIESEL & GAS ENGINES • AIR & ELECTRIC TOOLS

NEW CATALOGS

(Continued from page 144)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

REVERSIBLE ELECTRIC DRILLS — A four-page folder, JE-2263, featuring the company's new series of reversible heavy-duty electric drills is available from Thor Power Tool Co., Chicago, Ill. The folder details the one-third additional power, design developments, and complete specifications of the EN series of ⅝, ¾, ⅞, and 1-inch reversible portable electric drills. Also included are specifications of EL and EJ electric drill series, screwdriver-nutsetters, and impact wrenches.

Circle **Item 72** on Inquiry Card

TEMPERATURE, PRESSURE CONTROLS —Nine basic types of temperature and pressure controls are described in a new condensed catalog from Powers Regulator Co., Skokie, Ill. Included in the 12-page booklet are descriptions of self-operating regulators, water mixing equipment, pneumatic control instruments, indicating and recording instruments, and control valves. The equipment is designed for industrial process control, as well as for heating, ventilation, and air conditioning systems, and commercial and institutional hot water service applications.

Circle **Item 73** on Inquiry Card

LIGHTWEIGHT PIPE JOINING — An illustrated bulletin describing the Vic-Easy method of joining thin wall steel and aluminum pipe and tubing is offered by Victaulic Company of America, Elizabeth, N. J. The newly developed method provides positive, leak-tight connections by means of quick couplings assembled on grooves precision-rolled in the ends of the tubing. The system provides great speed and ease in assembly, and savings from lower initial cost and transportation cost of the light weight tubing. The bulletin gives details of the system and lists applications for which the method is suitable.

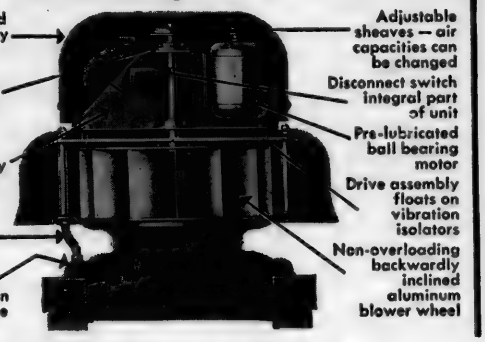
Circle **Item 74** on Inquiry Card

AIRFOIL CENTRIFUGAL FANS— A bulletin, No. 257, giving complete engineering data on type BC airfoil centrifugal fans is available from Ilg Electric Ventilating Co., Chicago, Ill. The publication is profusely illustrated with photographs showing construction details of the fans for all types of ventilating and air conditioning installations. Capacity tables, dimensional drawings, and suggested application arrangements are given, as are sample fan specifications, laws of fan performance, and other data useful in ventilator installations.

Circle **Item 75** on Inquiry Card

(Continued on page 148)

Lighter . . . because even the drive assembly is aluminum


Top cap hinged for accessibility to motor
Rubber sealed pre-lubricated self-aligning bearings
Drive assembly all aluminum, no steel
Pipe conduit integral part of unit
One-piece spun aluminum base
Adjustable sheaves — air capacities can be changed
Disconnect switch integral part of unit
Pre-lubricated ball bearing motor
Drive assembly floats on vibration isolators
Non-overloading backwardly inclined aluminum blower wheel

COOK Model CB All-aluminum Belt Drive Ventilators

Hinged hood makes motor easily accessible. Easy to clean.

Weighs only 280 lbs. in 16,500 cfm size

- 1,033 to 13,939 cfm.
- Only 39" high in largest size.
- Requires built-up curb of only 6".
- Low tip speeds.
- Light starting torque with aluminum blower wheel.

Ratings in accordance with standard test code by Texas Engineering Experiment Station, an approved AMCA test lab.

Write for Catalog or see Sweet's Architectural File. In Canada write to H. F. Clark, Ltd., 421 W. Broadway, Vancouver, B. C.

COOK

LOREN COOK COMPANY, Berea, Ohio

Plenty of Hot Water Round the Clock!

Galvanized water heaters with recovery rates from 107 GPH to 1200 GPH. Available in thirteen sizes, gas or oil fired.

Send for form No. H-151-9

MHM

Mt. Hawley MFG. CO.

MT. HAWLEY AIRPORT · PEORIA 4, ILLINOIS

NEW FAIL-SAFE Symmons TEMPTROL

Thermostatic Mixing Valve for Water

HAS REPLACEABLE CARTRIDGE

TEMPTROL – the new and only **fail-safe** thermostatic water mixer available with these outstanding features . . .

REPLACEABLE CARTRIDGE – which houses all working parts.

INSTANT SERVICE – Temptrol, with check stops, need never be removed from the line for costly servicing. A screwdriver to remove but four screws permits one to slip in new cartridge, if necessary—quickly—safely.

CONSTANT TEMP – hot water temperature is continuously and accurately maintained at all times.

ADJUSTMENT – temperature range from 90° all the way up to 180°.

AUTOMATIC – instant compensation for supply line temperature and pressure changes . . . safely shuts down on hot or cold failure.

INSTALLATION – can be installed at the heater as a Master Control, or anywhere along the line as a Zone Control.

CORROSION FREE – stainless steel control unit and electrolized sleeve assure extra long life and trouble-free performance.

ADDITIONAL PROTECTION – solid fill thermal element mounted out of the water in protected chamber open only to atmosphere.

AVAILABLE NOW – in four sizes: ¾", 1", 1¼" and 1½".

Truly a non-competitive item.

See SWEET'S ARCHITECTURAL FILE, DOMESTIC ENGINEERING CATALOG or write us direct for further information

Symmons ENGINEERING COMPANY

445 C STREET, BOSTON 10, MASSACHUSETTS

for DUST

CONTROL

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FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of dust collecting uses, particularly good for elbows and moving hoods.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
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THE FLEXAUST COMPANY
Dept. HV-12
[illegible] BARK AVE NEW YORK [illegible] N. Y.

NEW CATALOGS

(Continued from page 146)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ELECTRONIC CONTROL SYSTEM—In a new series of four bulletins, Series A-801, The Swartwout Co., Cleveland, Ohio, has released details of its Unitized AutroniC instrument line for indicating, recording and controlling temperature, pressure, level, flow, and pH. These informative publications include illustrations showing the functional convenience and flexibility of the design. Bulletin A-801 covers the system in general, with separate bulletins on the controller, the manual control unit, and recorders and indicators.

Circle **Item 76** on Inquiry Card

ALUMINUM SHEET—Much of the extremely useful data it has been able to compile on the subject of aluminum sheet has been organized and reduced to an easily readable 28-page two-color booklet by Revere Copper and Brass Inc., New York, N. Y. Entitled Revere Aluminum sheets, it has been laid out and written primarily as a working reference tool for engineers and others in those industries in which aluminum has already been established as a major raw material. It includes nomenclature, tables of standard tolerances and properties, and temper designations of aluminum sheet alloys.

Circle **Item 77** on Inquiry Card

PROTOTYPE FAN TESTING— A revised edition of the bulletin, Prototype Fan Testing and Computations for Testing Fan Equipment, is issued by Air Moving and Conditioning Association, Inc., Detroit, Mich. The 4-page illustrated bulletin, No. 151-57, tells how prototype (production unit) fans are tested to obtain accurate performance characteristics for a complete series of fans of the same or larger sizes. Also covered are definitions of test ratings, and deviations from the fan laws.

Circle **Item 78** on Inquiry Card

THERMOCOUPLE CALIBRATION CHART— Thermo Electric Co., Inc., Saddle Brook, N. J., is offering a handy, durable chart containing color codes and calibration symbols for thermocouples and thermocouple extension wires plus pyrometer wire resistance figures. This chart, 8½ x 11 inches in size and punched for three-ring binder use, is printed in two colors on heavy, card stock and plastic laminated for dirt and wear resistance. It concentrates on one, easy-to-read sheet, a ready store of useful pyrometric information.

Circle **Item 79** on Inquiry Card

(Continued on page 150)

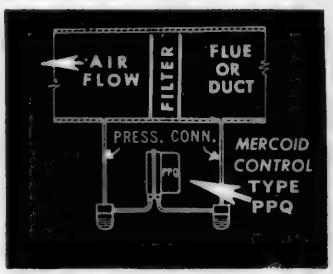
EXTREMELY
"Sensitive"
DIFFERENTIAL PRESSURE
Control
BY
MERCOID®

Has Hermetically Sealed Magnetic Mercury Switch

FOR AIR OR GAS
(INCHES OR FRACTION OF INCHES OF WATER)

For low pressure or vacuum—to "make" or "break" electrical circuits on small changes in the difference between two pressures. Examples: to indicate a change in resistance through a filter (see illustration); to indicate a change in differential due to a change in air flow conditions; to indicate interruption of air flow.

This control incorporates two pressure chambers separated by a sensitive diaphragm. Each chamber is connected to a separate pressure source and the control is set to operate as the relationship of the two pressures change.



OPERATING RANGES—6" vacuum to 6" pressure (sensitivity .03") and 30" vacuum to 30" pressure (sensitivity .1" to .2").

CIRCUIT ARRANGEMENTS—several models available to accomplish the following operations:

SPST—USING ONE MAGNETIC SWITCH—open or close switch contact either on an increase or decrease at pressure difference.

SPST—USING TWO MAGNETIC SWITCHES FOR TWO STAGE OPERATION. Open/close both switch contacts on an increase in pressure difference.

Open one contact on increasing pressure difference and one on decreasing pressure difference.

Close one contact on increasing pressure difference and one on decreasing pressure difference.

CASE STYLES—three types to meet following conditions: Indoor (general purpose), Outdoor (weather resistant), and Hazardous locations (explosion-proof).

WRITE FOR BULLETIN No. 14N

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

THE weil TVC

New *Condensate Pumps*

Features:
Low speed (1750 RPM) TVC pumps are easily installed in areas where space is important. Their compact cast iron receiver and sturdy pumping unit assure a trouble-free installation.

Dimensions:
26 gallon cast iron receiver for single or duplex units: Diameter 25"; height of return above floor 10½"; height of unit 36" max.

Installation:
Simple installation: one return connection, one discharge connection. Unit is completely assembled at the factory. Send for Bulletin TVC-300.

Send for Bulletin TVC-300

See Catalog in 1957 Sweet's and 1957 Domestic Eng. Cat. Dir.

Available from Jobbers Stocks!

TVC PUMPS now available in capacities from 750 to 15,000 sq. ft. E.D.R.

The three sizes of TVC receivers now offer a complete line of low pressure system condensate pumps to fit all requirements. The LOW RETURN CONNECTION and LOW SPEED — 1750 R.P.M., coupled with the built-in durability, operating efficiency and low cost of these pumps guarantee a satisfactory and trouble free installation. This pump provides gravity drainage for low heating units.

Specify and install a **weil** TVC Pump.

Built for ONE MILLION STARTS . . . without attention

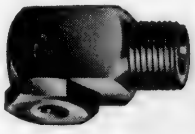
1516 North Fremont Street • Chicago 22, Illinois

Design... Capacity

SPRAY NOZZLES

TO LOWER THE COST OF CONDITIONING AIR

• With spray nozzles from Spraying Systems you gain the advantages of DESIGN for *exact* control of spray characteristics . . . and a complete range of sizes for selecting the *exact* CAPACITY needed.

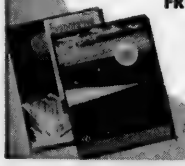


FOR WASHING—wide angle Whirljet spray nozzles. Large orifice, non-clogging with tapered inlet, no internal vanes.

FOR HUMIDIFYING—precision made Pneumatic Atomizing nozzles. Highly atomized spray vaporizes instantly and completely.

FOR COOLING—complete choice of nozzles for spray ponds, cooling towers and roof cooling. Proper distribution and atomization for efficient cooling and minimum driftage.

FREE INFORMATION—*just write for Bulletins 81 and 82.*



SPRAYING SYSTEMS CO.
3261 Randolph Street
Bellwood, Illinois

Rempe

HEAVY DUTY STEAM COILS
(DISTRIBUTOR TYPE)

Tilted feature assures drainage of condensate whether used for vertical or horizontal air flow.

HEAVY DUTY CONSTRUCTION

Cover pieces at header and stub ends are perforated to allow passage of measured amount of by-pass air —gives increased coil capacity—eliminates hot and stress. Every square foot of face area produces equal heating capacity on full or modulated steam supply. Two row or one row available. ***Write for details***

REMPE CO. — HEAT TRANSFER EQUIPMENT — CHICAGO

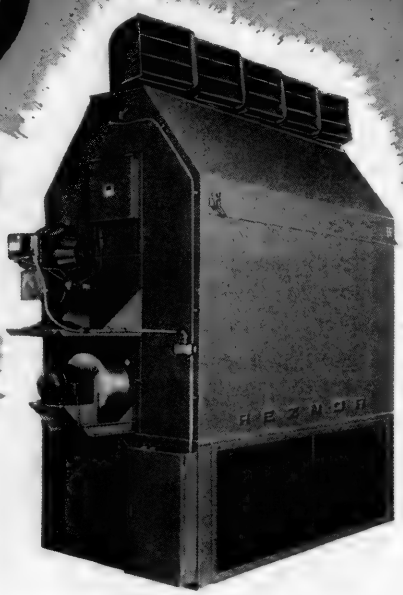
REMPE COMPANY
358 N. Sacramento Blvd.
Chicago 12, Illinois

Here's the answer to your

BIG SPACE HEATING PROBLEMS

Reznor-Olson

STAINLESS STEEL DIRECT FIRED HEATERS



These units are designed for heating factories, warehouses, garages, airplane hangars, gymnasiums and other large open areas. They pick cold air up off the floor, distribute heated air overhead at high velocity—either direct or thru ducts. In addition to space heating installations, Reznor-Olson heaters are well-suited for use in make-up air systems and in drying and other process applications.

Reznor-Olson heaters are available in ten sizes — 400,000 to 2,000,000 Btu — with gas, oil or dual-fuel burners. They may be floor mounted for top discharge or suspended for down-blast or horizontal discharge.

New Bulletin gives Complete Specifications

Complete specification information — including dimensions, control details, temperature rise, air delivery and fuel consumption — is included in a new bulletin, F-57A-RO. If you don't have a copy of this bulletin in your files, just fill out and mail the coupon below. Do it today.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS

Reznor Manufacturing Company, 64 Union St., Mercer, Pa.

Please send me a copy of your bulletin F-57A-RO which gives complete specification data and construction details on Reznor-Olson direct fired heaters.

Name_____

Company_____

Street_____

City_____ Zone_____ State_____

NEW CATALOGS

(Continued from page 148)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

INDUSTRIAL WATER CONTROL—Process Instruments Division of Beckman Instruments, Inc., Fullerton, Calif., announces publication of The Industrial pH Handbook. This 80-page handbook is the first manual ever published giving such thorough coverage of industrial pH information under one cover. Handbook reviews industrial pH control systems, their principles, application engineering and equipment, providing a convenient reference source on pH for persons involved in designing, engineering, purchasing, and operating industrial pH systems.

Circle **Item 80** on Inquiry Card

AIR CONTROL VALVES—Hanna Engineering Works, Chicago, Ill., has published a catalog, No. 262, describing its Flo-Pilot air control valves. These ¼-inch, 2 and 3-way bar stock valves offer a choice of five interchangeable actuating heads for air operation to 150 psi. "Idea starters" for control circuits utilizing the valves are illustrated in the booklet.

Circle **Item 81** on Inquiry Card

MOTOR OPERATED VALVES—Bulletin V562, published by National Controls, Inc., Newton Centre, Mass., covers its line of motor-operated valves. There have been several design changes since coverage of the line in ACHV's New Equipment department last year, company states. Full capacity and dimensional data are given.

Circle **Item 82** on Inquiry Card

CONTROL VALVE SELECTION — Six-page Bulletin 655, How to Select, Size, and Order Temperature Control Valves, tells how to select proper body material, valve trim, and thermal systems. Detailed, but simple, formulas and examples show how to assure proper valve sizing, essential to accurate control. Bulletin, published by Jordan Industrial Sales Div., OPW Corporation, Cincinnati, Ohio, lists information needed by manufacturers to furnish proper valves.

Circle **Item 83** on Inquiry Card

CAST BRASS FITTINGS — Available from Lee Brothers Foundry Co., Anniston, Ala., is Catalog No. 58, 48-pages long with 3-color covers. This book illustrates and describes over 5,000 items in cast solder fittings, cast drainage fittings, flared tube fittings and screwed and flanged fittings and valves. There are numerous helpful mechanical drawings and other engineering data.

Circle **Item 84** on Inquiry Card

(Continued on page 152)

A Complete Combustion Efficiency Test In 30 Seconds With the NEW, Low-Cost

DWYER COMBUSTION TEST KIT (No. 1100)

Dwyer CONTROLS GAGES

- *SIMPLE TO USE*
- *LIFETIME ACCURACY*
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- *INEXPENSIVE*

Includes:

CO_2 Indicator	Smoke Gage
Draft Gage*	Slide Rule Computer
Stack Thermometer	Magneclips
	Instructions

...and all necessary accessories and fittings

Here's everything you need for a thorough, professional job of combustion testing. This new DWYER Kit simplifies the testing of any installation . . . residential, commercial or industrial: gas, oil or coal fired. You can perform a complete analysis in less than 30 seconds . . . *accurate to within ±½% CO_2.*

Handy, handsome metal kit—(also available with CO_2 Indicator alone)—is custom-fitted for all necessary parts and accessories.

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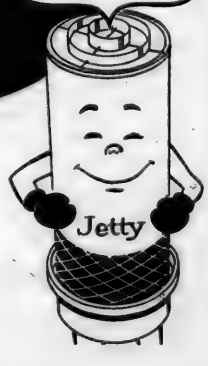

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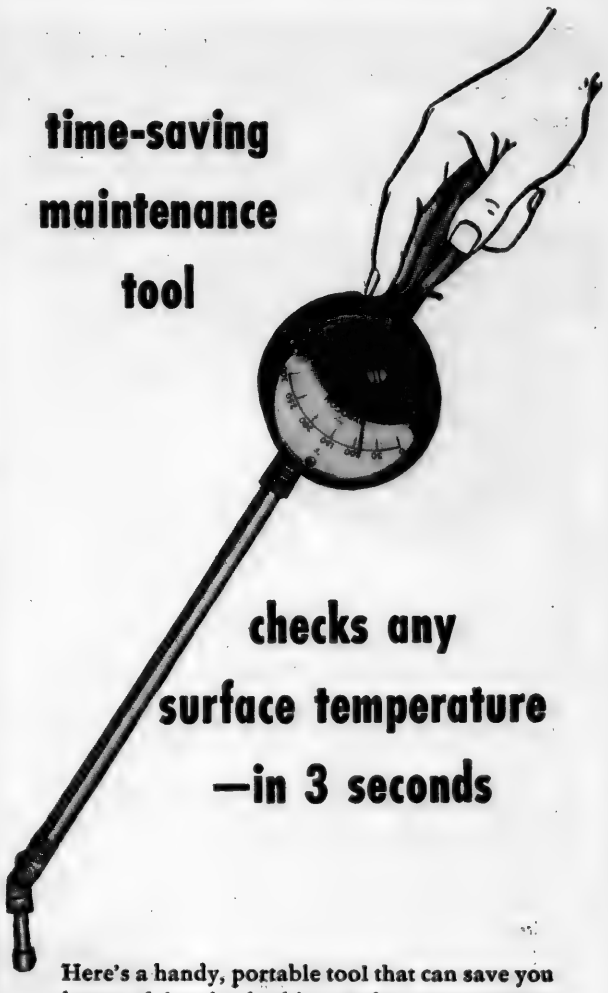

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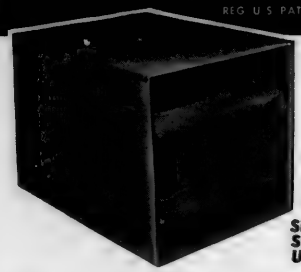

Single Unit Standard Uni-Silencer

THE NEW SILENCER FOR AIR CONDITIONING AND VENTILATING SYSTEMS!

UNI-SILENCERS* and UNI-RESONATORS* have been designed specifically to reduce the airborne noise generated by fans in industrial ventilating and air conditioning systems. Low in cost from both the original purchase and installation view, Uni-Silencers are delivered in cartons weighing about 75 lbs. each. They may be easily and inexpensively transported into the building, to the specific location required.

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UNI-SILENCERS* are sold on a *guaranteed* basis. Interior and exterior surfaces are smooth, made of perforated and unperforated metal to reduce resistance to a minimum.

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Please send complete literature on Uni-Silencers and Uni-Resonators, without charge or obligation.

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NEW CATALOGS

(Continued from page 150)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PORTABLE ELECTRIC TOOLS — A 30-page 1958 buying guide, No. 105, describes 70 portable electric tools and kits with over 400 accessories for builders, utility and maintenance crews, carpenters, heating, plumbing and air conditioning contractors. Available from Porter-Cable Machine Co., Syracuse, N. Y., this buying guide includes over 150 pictures of tools and their uses with complete specifications and prices for electric saws, sanders, drills, planes, routers, shapers, and combination tools.

Circle **Item 85** on Inquiry Card

HEAVY DUTY COOLING TOWERS — M. Blazer & Son, Passaic, N. J., has published a 6-page bulletin describing its Tru-Air line of cooling towers with capacities from 10 to 200 tons. Towers are of heavy duty construction, designed for minimum maintenance, and completely fireproof. Units are available with centrifugal or axial flow fans.

Circle **Item 86** on Inquiry Card

PNEUMATIC TEST BALLS — Wade Manufacturing Co., Elgin, Ill., announces a brochure describing the Cherne test balls. In addition to the full line of pneumatic test balls for 2 to 10-inch pipe lines and fittings, a new 4-inch long test ball has been added to the line for testing sewer lines to residences and commercial buildings. One test ball may be used in place of six different conventional test plugs.

Circle **Item 87** on Inquiry Card

DUAL-DUCT AIR MIXING UNITS — Photographs, details, and dimensions of dual-duct air mixing units are carried in a new 2-color catalog issued by Buensod-Stacey, Inc., New York, N. Y. The catalog is designated Bulletin DD-4, and has eight pages.

Circle **Item 88** on Inquiry Card

SEAMLESS STAINLESS PIPE COSTS — Engineers, buyers, estimators, and others responsible for the specification and procurement of seamless stainless pipe and tubing will be interested in the comparative price data furnished on Technical Data Card No. 188, published by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. This card furnishes the analysis details and comparative price ratios of thirty-three seamless stainless grades using Type 304 (18-8) as a base.

Circle **Item 89** on Inquiry Card

(Concluded on page 154)

Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9' to 22'.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal . . . Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue . . . true airfoil blade sections assure maximum air delivery . . . adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

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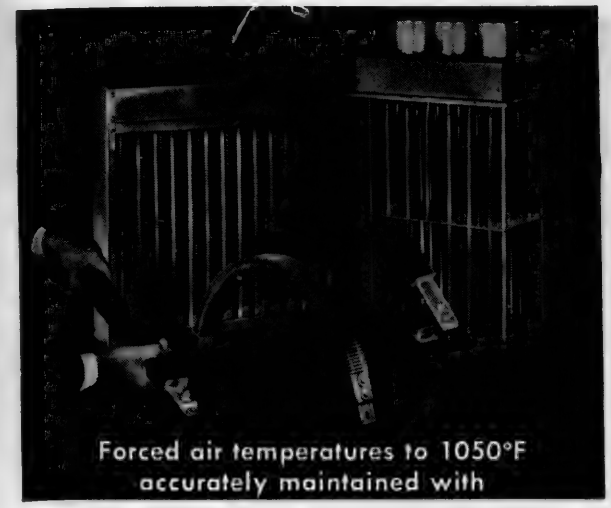

Forced air temperatures to 1050°F accurately maintained with

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For heating air under forced circulation, Chromalox Electric Air Duct Heaters are the efficient, economical answer.

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C-2132

FREE BULLETIN—Call your Chromalox Representative or write for Bulletin F-1559

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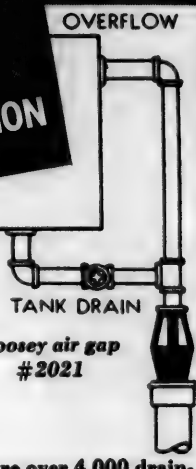

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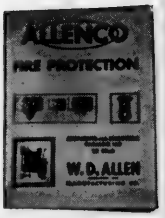

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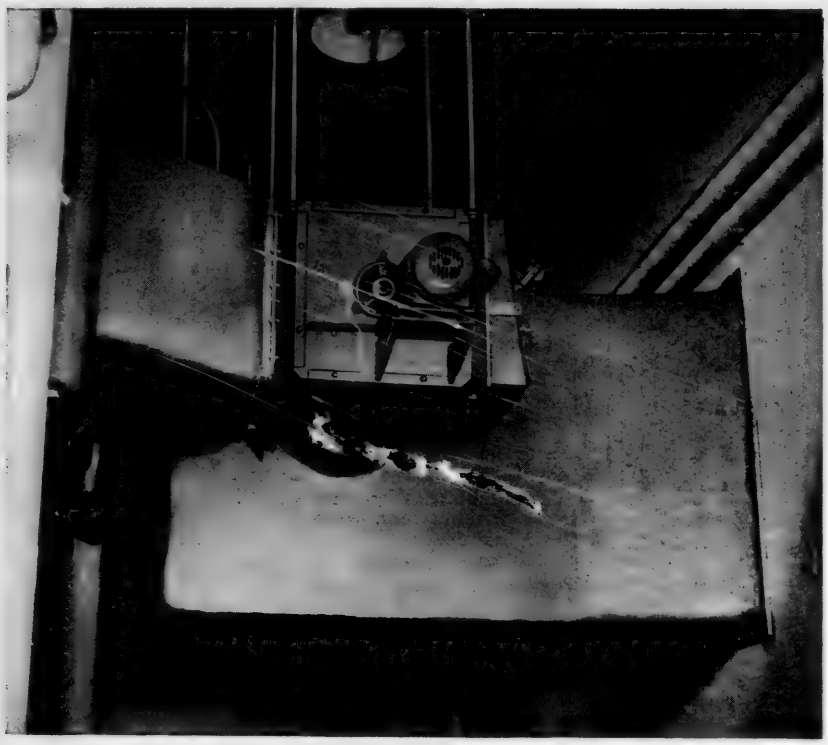

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NEW CATALOGS

(Concluded from page 152)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

HEATING CONTROLS—Specific and detailed information on heating controls is available from Heating Div., Tork Time Controls, Inc., Mount Vernon, N. Y., in their Heating Manual (Bulletin 856-A). It is intended to serve as a working manual for on-the-job-use in the heating industry. With the aid of the manual, the proper time switch, for optimum results on a particular installation, can be easily specified. In addition to illustrating and describing time switches for use in every phase of building and plant heating, the manual provides full specifications on each unit and typical wiring diagrams.

Circle **Item 90** on Inquiry Card

INDUSTRIAL CORROSION—Documented case histories of the use of Argo-170 polyethylene as a chemically inert replacement for metal, rubber, and other anti-corrosion materials highlight a new booklet published by Argo Plastic Products Co., Cleveland, Ohio. The 19-page booklet describes successful solutions to the troublesome, expensive corrosion problems encountered by well-known industrial companies. Actual savings effected on installation and maintenance costs are given.

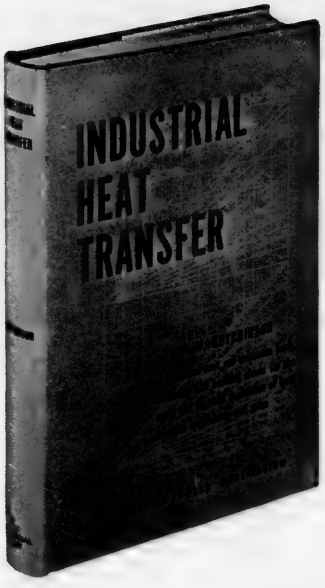
Circle **Item 91** on Inquiry Card

FROST-PROOF WALL HYDRANTS — A 2-page bulletin describing its No. 375 and No. 376 frost-proof wall hydrants is announced by Mansfield Sanitary, Inc., Perrysville, Ohio. Printed in 3 colors, it contains numerous illustrations that show design features. In addition, a complete parts list is included. According to the bulletin, new wall hydrants eliminate all possibility of freezing during the winter season. Water supply is controlled through a valve seat located within the warm home or building, at the end of an extra long stem. Besides preventing possibility of freezing, this also eliminates need for cut-off valves.

Circle **Item 92** on Inquiry Card

HEATING-BOILER WATER TREATMENT—Treatment of water in low pressure heating boilers is the subject of a bulletin published by Water Service Laboratories, Inc., New York, N. Y. The leaflet describes the operating troubles caused by impurities in the feed water, and outlines the procedure for minimizing damage to the boilers and maintaining maximum efficiency. Subjects covered include corrosion and scale prevention, tube failures, cast iron boilers, and treatment of boiler water.

Circle **Item 93** on Inquiry Card



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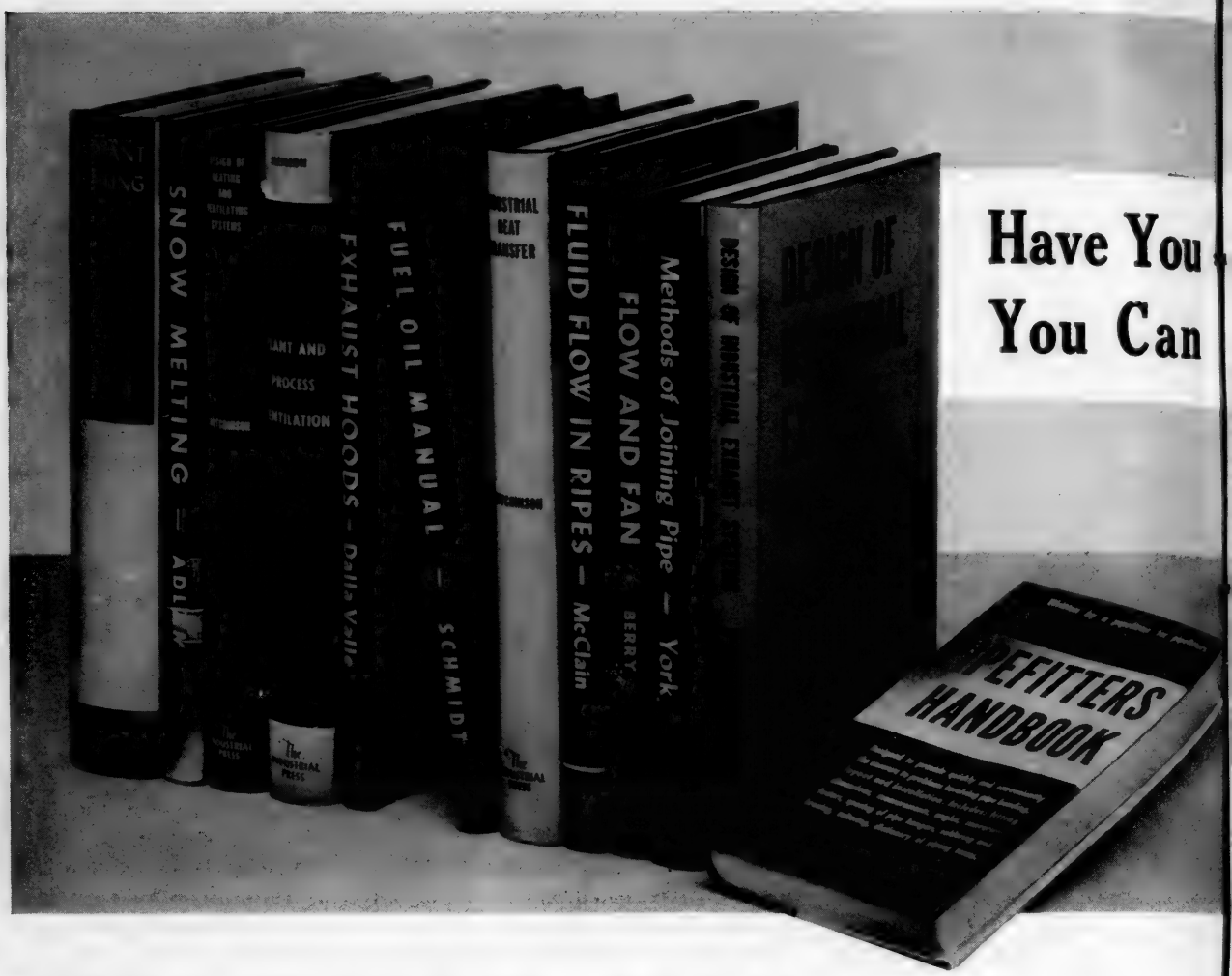
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CLASSIFIED ADVERTISING

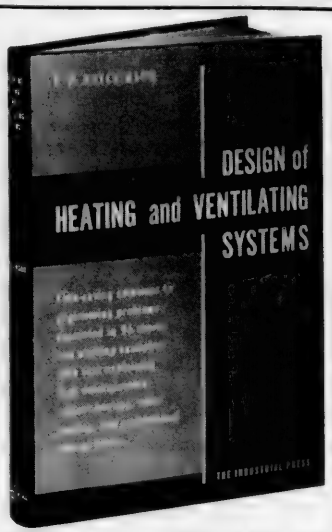
Sold at $12 per column inch.

MANUFACTURER'S AGENTS

An established manufacturer with 25 years experience producing ventilating equipment is looking for manufacturers' agents in many sections of the country to sell their new line of industrial fans. The products include axial flow and tubeaxial fans, both direct and belt driven, and power roof ventilators.

Please reply Box 914, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, start-up sheet and others. Also can supply BURNER SERVICE form in 8 part EZE-SNAP with 2 carbons in each set. 1200 sets IMPRINTED with your name, address and telephone, only $20.40. Send for samples—no obligation. Write Dept. AC, Degree Day Systems, 39-30 58th St., Woodside 77, N. Y.



SOLVE COMPLEX CALCULATIONS EASILY . . . FAST!

DESIGN OF HEATING AND VENTILATING SYSTEMS contains 96 working graphs from which you can solve problems involving load determination, duct design, panel heating, solar heating and combustion analysis *directly.*

The scales used in constructing the graphs have been selected so that *the accuracy to which each graph can be read will equal or exceed the limits of accuracy of the equation from which it was derived.*

$7.00

In Canada or overseas, $7.80

320 Pages 96 Charts & Illustrations

THE INDUSTRIAL PRESS

93 Worth Street, New York 13, N.Y.

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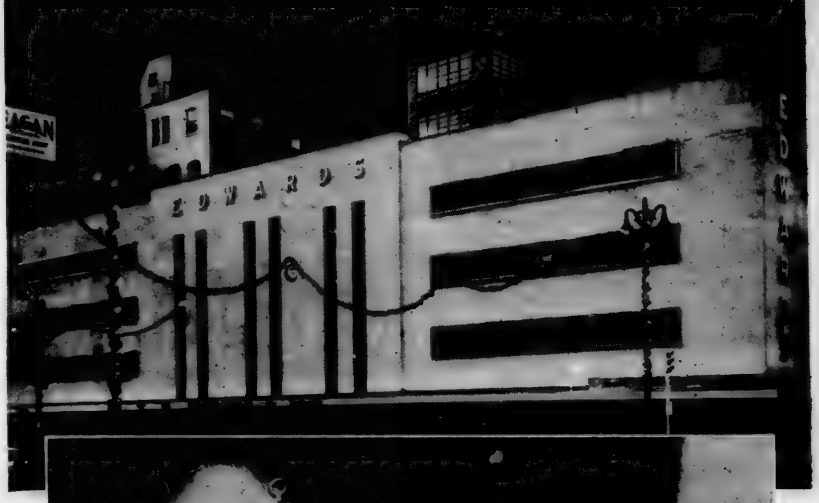
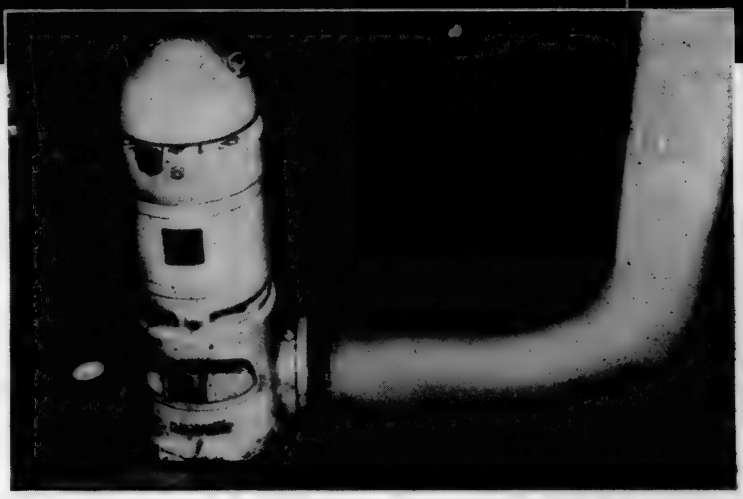
SAVED: $30,000 ANNUALLY
on Water Costs for this Building!





Deming Pump Supplies Water for Air Conditioning System

1,500,000 gallons of water daily are required to cool air conditioning units in three multistory buildings in Syracuse, New York. The system is in peak-load operation about 4½ months a year.

Water was costing the company about $1,300 a week. A Deming Distributor co-operated with the management to reduce that high cost. After determining that underground water was available in ample volume and of the desired temperature, a deep well was drilled on company property. A 25 H.P. Deming Vertical Turbine Pump was installed. Compared with former water costs, the installation is saving the company about $30,000 annually.

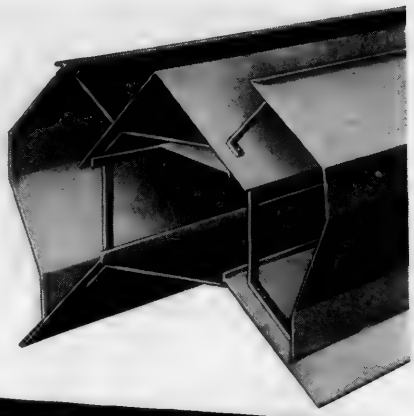
Ask your local Deming Distributor, or write to us, for specific information on the use of Deming Vertical Turbine Pumps for air conditioning service.

THE DEMING COMPANY • 558 Broadway, Salem, Ohio

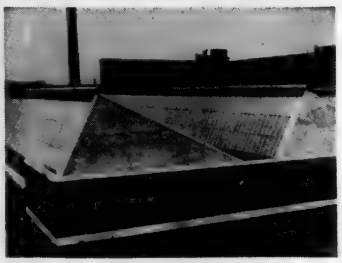
DEMING

INDUSTRIAL PUMPS

Thousands of buildings efficiently ventilated by



Swartwout Heat Valve®



...the *original* continuous roof ventilator

Heat Valve is designed for maximum capacity with least possible friction in all its throat sizes — 4" to 42" — ten in all. Its contour invites assistance from outside air currents to *pull* unwanted heat, smoke and fumes out of the building. Made in ten-foot lengths as standard, Heat Valve is adaptable to any need — from single sections spotted where most needed, to continuous runs the length of the roof.

Any roof style — peak, slope, flat, saw-tooth — accommodates Swartwout Heat Valve. Ventilator is always weatherproof. Adjustable damper controlled by several optional methods, any position from tight closed to wide open.

You can provide practically any area of roof opening desired with this efficient gravity ventilation, at economical cost. Thousands of miles of Heat Valve used on many types of buildings since its introduction by Swartwout in 1934 . . . Write for fully illustrated Bulletin HV-H.

The Swartwout Company

18511 Euclid Avenue **Cleveland 12, Ohio**

Representatives in all principal cities

Swartwout ROOF VENTILATORS AND VENTILATING LOUVERS

ALSO AUTRONIC PROCESS CONTROL EQUIPMENT

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HUGHES PRINTING CO.
EAST STROUDSBURG, PA.

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

FAN NOISE CONTROL
Calibrated reverberation test rooms are only a part of the company's continuing research program devoted to predicting and reducing fan noise. Information on fan ratings is available. Also available at cost of $2 when requested on business letterhead is book entitled "Controlling Ventilation Noises."
Page 1 — Item 200

COPPER-LINED STORAGE HEATER
Used by Marywood College, Scranton, Pa., for rust-free hot water since 1949, is reordered in expansion program in progress. Non-corrosive copper combined with the superior strength of steel. New data file offered.
Page 5 — Item 201

CONDENSATE PUMPS
Economy minded engineers specify these pumps because of their time proven performance in handling condensate. Bronze fittings throughout. Stainless steel shaft insures long life, proper adjustment. Bulletin available.
Page 9 — Item 202

INDIVIDUAL ROOM CONDITIONING
Ceiling and hide-away units having nominal capacity of 2, 3 and 5 tons are now available for year-round individual room conditioning in commercial and residential applications. Floor type units are also offered. Information is available.
Page 13 — Item 203

SNOW MELTING INSTALLATION
Illustrated in this ad is a forced hot water heating system design for a snow melting installation. This is one of the system designs shown in complete detail in the company's engineering manual which is available.
Pages 14-15 — Item 204

MOTOR CONTROL
Manufacturers of large air conditioning and refrigeration systems realize that the reliability of their system and the reliability of the motor control used are identical. That is why this company's trademark is so frequently seen on important jobs. Catalog is available.
Page 16 — Item 205

AIR MOVING EQUIPMENT RATINGS
Practically all leading manufacturers of air moving equipment are planning to qualify their standard products in tests made in accordance with the AMCA standard test code. Details on rating program are available.
Insert Between Pages 16-17 — Item 206

ZINC-COATED STEEL
The manufacturer's continuous-process zinc coating thrives on toughest fabrication steps, as demonstrated by exposure to smashing attempts by a half-ton steel wrecking ball. Booklet on zinc-coated steel is available.
Page 17 — Item 207

TRAPS FOR HEATING, PROCESSING
The manufacturer's traps were chosen for Sheaffer Pen Company's plant in both building heating and processing operations after plant engineer's pre-testing of six manufacturers' traps. Bulletin is available.
Pages 18-19 — Item 208

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

THIRTY MILES OF COPPER TUBE
3000 control valves, 1000 thermostats, and dozens of panel boards, all inter-connected by a 30-mile network of the manufacturer's copper tube control the temperature, flow and pressure of air, steam and water for the air conditioning system in New York's bronze skyscraper. Information is available.
Pages 20-21 — Item 209

THERMAL, SONIC INSULATION
Fiber glass insulation is shown being applied to heaters, guaranteeing heater efficiency above 80%. Of constant resiliency, insulation material will not irritate skin of those who handle it. Ideal for sound deadening, too. Information available.
Page 22 — Item 210

BAROMETRIC DRAFT CONTROLS
Barometric draft controls increase the efficiency of induced draft installations. The control, sensitive to the slightest change in pressure, corrects for any variation, holding the draft to the required setting. Technical data is available.
Page 23 — Item 211

FINNED-TUBE RADIATION
Simple, r u g g e d construction and smoothly fitting components give a custom-built appearance on every job using the manufacturer's finned-tube radiation. Information is available.
Pages 24-25 — Item 212

STEEL PIPE
Providing dependability and long life for Lamson & Sessions Co., Cleveland, Ohio, producers of industrial fasteners, will be tons of the manufacturer's quality steel pipe. Information is available.
Page 26 — Item 213

BRONZE HEATING VALVES
The manufacturer offers one of the largest and most comprehensive lines of bronze heating valves. Included are packed type radiator valves and elbows for steam and gravity hot water systems; and circulating valves, balancing elbows and fittings for forced hot water heating systems. Condensed catalog is available.
Page 27 — Item 214

FORCED DRAFT PACKAGE UNITS
A new series of package units makes forced draft firing, with all its benefits, available for smaller boiler plants. For high or low pressure, steam or hot water, all sizes and all fuels, these forced draft package units are ready to hook up and go. Technical specifications are available.
Pages 28-29 — Item 215

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66
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PLEASE PRINT Dec. H-57

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City ..... **Zone** .... **State** .....

This card is void after March 1, 1958

Ad-Digest

AUTOMATIC AIR FILTERS
Company's filters have no equal because the media used is unique. The fluffy white blanket of bonded glass fibers is the result of dozens of research projects. Bulletin available.
Page 30 Item 216

METAL FABRICATION
This company combines vast experience in metal fabrication with a complete range of special linings for low cost long-lived tanks and receptacles. Information is available.
Page 31 Item 217

IRON BODY GATE VALVES
Better performing 125 lb. iron body wedge gate valves are offered by this manufacturer. Improved design gives them greater strength and important operational advantages. Information is available.
Page 32 Item 218

TEMPERATURE AND SUN CONTROL
Pneumatic temperature control system plus louvered sun control equal thermal comfort and economy in new commercial building in Los Angeles. Information is available.
Page 33 Item 219

ELECTRIC MOTORS
Company's incremental motor-starter combinations limit inrush of current when starting big motors providing many years of trouble-free operation. Company has been supplying these combinations for 17 years. Bulletins available.
Page 34 Item 220

STEAM SPECIALTIES
For either one-pipe or two-pipe residential or industrial systems this company has a trap, valve, pump or other specialty designed to give better control of every requirement. Catalog is available.
Page 35 Item 221

DUCT FANS CUT COST
Belt drive duct fan, for corrosive fumes, bi-pass duct fans for high temperature corrosive fumes and air, and reversible duct fans to move air in either direction with equal efficiency are described. Complete details are contained in bulletin.
Page 36 Item 222

COPPER PIPE AND TUBING
The manufacturer's plant, simulating an obedience school for pups, makes copper pure, smooth and submissive to meet high standards as pipe and tubing. Information is available.
Page 37 Item 223

MOTORS FOR AIR CONDITIONING
The silence of these motors for air conditioning systems is golden. It's vital for motels, hospitals and other institutions where quiet comfort is a must. Bulletin is available.
Page 38 Item 224

FANS FOR HIGH PRESSURE WORK
Company's fans are designed for maximum efficiency, quiet operation, service-free performance, adaptability to various inlet control, and ease of installation. They are ideal for high-pressure air moving applications. Bulletin available.
Page 39 Item 225

HEATING SPECIALTIES
Available from this manufacturer is a complete line of heating specialties including radiator valves and traps. F & T traps, bucket traps and boiler gages. Equipment catalog is available.
Page 40 Item 226

AIR CONDITIONING PACKAGE
Proper control of humidity is an important consideration in air conditioning a printing plant. At General Offset and Printing Company in Springfield, Mass. the manufacturer's cabinet-complete air conditioning system was selected to air condition the paper storage area, press room, and stripping room. Information is available.
Page 41 Item 227

ELECTRIC ROOF VENTILATORS
These electric roof ventilators offer users PFMA rated units that embody sturdiness, high performance ratings, and low noise levels. Sizes range from 12 to 60-inch wheels, 640 to 45,000 cfm. Three bulletins are available.
Page 42 Item 228

BOILER WATER LEVEL CONTROLS
One thing that can be done to insure the safety of our school children is to see that the boiler water line is under the endless vigil of good quality level controls. Shown are boiler water feeder and low water cut-off combination, pressure relief valve, and pump control cut-off and alarm switch. Information available.
Page 43 Item 229

HIGH-CAPACITY COILS
Steam coils available in standard and non-freezing types. Water coils for use with chilled or hot water. Direct expansion coils equipped with pressure type distributor circuited for minimum refrigerant pressure drop. Information available.
Page 44 Item 230

ARTIFICIAL ICE RINK
The manufacturer's informative series of practical piping layouts is continued in this ad with a piping plan for an artificial ice skating rink. Enlarged diagram and full description are available.
Page 45 Item 231

MOTOR SHRUNK ONE FULL INCH
A more compact motor for new, thin air conditioners is only 3¼ inches long. 1/12 hp, 4-pole. Information available.
Page 46 Item 232

DUCT COUPLINGS
A Ventiduct coupling system joins heating, ventilating and air conditioning duct sections quickly and easily without welding or riveting. Of corrosion resistant stainless steel, duct couplings are easy to install, long lasting and adjustable to various diameters. Information is available.
Page 47 Item 233

HIGH TEMPERATURE WATER
High temperature water is rapidly finding increasing acceptance as ideal means of heating large areas. A big factor in bringing this trend about is the company's controlled circulation hot water boiler. Catalog is available.
Page 48 Item 234

FITTINGS AND FLANGES
The cost of fittings is a small fraction of the total cost of a piping system. To buy cheap fittings and run the risk of impairing performance of an entire system can, therefore, be "penny wise and pound foolish." Investment is safeguarded with the manufacturer's fittings and flanges. Now welded piping standard is available.
Insert Between Pages 48-49 Item 235

BALL BEARINGS BOOST SALES
Manufacturer's ball bearings are designed expressly for residential heating and air conditioning equipment. The bearings feature balls and races especially finished for quiet performance. Information is available.
Page 49 Item 236

STANDARD, SPECIAL PIPE JOINTS
Advertisement illustrates and explains the application of Gimbal expansion joint and hinge expansion joint in 8 in. pipeline at Allied Chemical and Die Corp. plant. Information available.
Page 50 Item 237

PACKAGED STEAM GENERATORS
A timely thought from this company is that men may reach the moon before you replace the boiler you buy today. The equipment you buy today determines your steam costs for years to come. These packaged steam generators are designed and built to last longer. Catalogs are available.
Page 51 Item 238

AIR DIFFUSERS
Custom made in unlimited air patterns, these square and rectangular air diffusers suit all air conditions and blend perfectly with any interior design. Catalog is available.
Page 99 Item 239

STORAGE HEATER AND TANKS
Designed to meet the hot water needs of huge District of Columbia Hospital Center, they supply thousands of gallons of hospital-pure hot water. Information is available.
Page 101 Item 240

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 52, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

DOOR GRILLES
Company's door grilles provide free air movement for offices, dressing rooms, locker rooms, school rooms and other areas without unsightly see-through gaps. Of rattle-proof construction, door grilles withstand scuffing and kicking. Catalog is available.
Page 105 Item 241

SOUND TRAPS KILL DUCT NOISES
In all frequencies. If unit fits geometrically, it fits acoustically. Space saving, it permits guaranteed performance with no bulky mufflers. Applications in every building. Information available.
Page 109 Item 242

AIR-COOLED CONDENSER
Company's air-cooled condenser plus year-round automatic head pressure control guarantees maximum pressure at expansion valve in winter, maximum summer capacity, prompt defrosting, immediate compressor start-up. Bulletin available.
Page 111 Item 243

REFRIGERATING UNITS
Any cooling needs including cool air, drinking water, ice, or refrigeration for processing in any commercial or industrial size is met by the manufacturer's refrigerating units. Data available.
Page 113 Item 244

FUEL OIL PRE-HEATER
Number one in a series of idea sheets from this company describes use of secondary steam to pre-heat heavy fuel oil in a high temperature hot water system. Additional data are available.
Page 115 Item 245

REGISTERS AND GRILLES
These registers and grilles guarantee comfort in air systems through easy installation, trouble free operation and the right air distribution for every conditioned space. Catalog is available.
Page 117 Item 246

HEAVY-OIL BURNER
Company offers a simple and practical and, hence, dependable burner for residual oils which are low-cost fuels having higher heat value than light oils. Heavy oils Nos. 5 and 6 are easily controlled and burned by system which is remarkably free from mechanical complexities. Catalog available.
Page 121 Item 247

SEWAGE PUMPS
In new 375 Park Avenue building, New York, which uses only the highest quality materials and workmanship, they use this company's sewage pumps for continuous trouble-free waste disposal service. Over 13,000 sold. Not one has ever clogged. Information available.
Page 123 Item 248

HIGH VELOCITY SYSTEM
Illustrated are two ways of using the company's all-air high velocity system of draftless air distribution for heating and ventilating of schools. Individual or zone-controlled, in single or dual-duct installation, is possible. Selection manual is available.
Page 125 Item 249

UNIT HEATERS FOR ANY JOB
All types, sizes, and styles of unit heaters to meet any exacting heat requirement are designed and manufactured by this company. Steam, hot water, or gas-fired unit heaters last longer, cost less to install. Bulletins available.
Page 127 Item 250

REFRIGERANT CONTROLS
The manufacturer offers a complete line of refrigerant controls with product quality assured. Line includes thermostatic expansion valves, refrigerant distributors and suction line regulators. Bulletin is available.
Page 129 Item 251

REFRIGERANT DISTRIBUTORS
Whether the need is two circuits or two dozen, these refrigerant distributors offer peak performance regardless of load or evaporator temperatures. They are adaptable to all refrigerants. Information is available.
Page 131 Item 252

CONTROLLED HUMIDITY
Air conditioning method removes moisture from air by contact with a liquid in a small spray chamber. Heating and cooling separate. Precise humidity under any conditions. Bulletins available.
Page 132 Item 253

MOTOR-COMPRESSORS
New 4-5 horsepower sizes in the manufacturer's line of motor-compressors meet industry needs for the big residential and commercial cooling market. Units are quiet, rugged and accessible. Information is available.
Page 133 Item 254

AIR CONDITIONING EQUIPMENT
Twenty-eight full lines of air conditioning equipment are itemized in advertisement. Includes room air conditioners, air handling units, multi-zone types, packaged water chillers, coils, cooling towers, etc. Selection of bulletins offered.
Page 134 Item 255

ROOF VENTILATION ENGINEERING
The line of roof ventilators made by this company includes a low contour model, a large volume model for high velocities, wind driven turbine types and exhaust fans for corrosive fumes. Catalog with specifications and performance data is available.
Page 136 Item 256

GAS FIRED BOILER
This sectional cast iron boiler is distinguished by a long list of features which enable it to perform economically year after year. Among them are space saving compactness, low head room requirement and completely insulated jacket. Information is available.
Page 137 Item 257

WARM AIR HEATING LINE
Three furnaces in the manufacturer's warm air heating line solved difficult heating problems of new lithograph plant in Philadelphia. Information is available.
Page 138 Item 258

AUTOMATIC REGULATING VALVES
Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines. Trouble shooting is faster, downtime is reduced. Bulletin is available.
Page 139 Item 259

INDUSTRIAL VENTILATION
Industrial ventilation problems are solved in efficient manner by complete line, certified performance, and competitive pricing of manufacturer's air moving equipment. Catalog is available.
Page 140 Item 260

BOILER COSTS ANALYZED
Cost analysis proves in most cases that a self-contained boiler costs less. Completely packaged installation, pre-testing, starting service, and on-the-job operator training decreases over-all costs. Details are available.
Page 142 Item 261

POSITIVE SEALING INDICATORS
Proven on thousands of production line installations, indicators have one piece extension gasket for positive sealing and fool-proof assembly. Complete line catalog available.
Page 143 Item 262

STAINLESS STEEL FLOATS
The inherent strength of stainless steel makes it ideal for liquid level control operating under high pressure or high temperature. Catalog is available with technical float data.
Page 145 Item 263

INDICATORS AND TANK GAGES
Manufacturer features instruments for liquid depth measurement and remote indication of specific gravity. Two bulletins are available.
Page 148 Item 264

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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PLEASE PRINT Dec. H-57

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City ..... Zone .... State .....

This card is void after March 1, 1958

Ad-Digest

LOW SILHOUETTE COOLING TOWER
This series of cooling towers permits installations that are out of sight at street level. Maximum high range from 6 to 7½ ft. through the entire selection of framed sizes. Bulletins available.
Page 144 Item 265

GENERAL HYDRAULIC PUMPS
Double mechanical shaft seals and permanently lubricated ball bearings are two advanced features of these hydraulic pumps that help end pump maintenance problems. Bulletin is available.
Page 146 Item 266

FAIL-SAFE MIXING VALVE
Thermostatic mixing valve for water has replaceable cartridge which houses all working parts. Never needs to be removed from line for costly servicing. Corrosion free. Information available.
Page 147 Item 267

BELT DRIVEN VENTILATORS
All aluminum belt driven ventilators from this company are light because even the drive assembly is aluminum. The 16,-800 cfm size weighs only 280 lb. Catalog is available.
Page 147 Item 268

GALVANIZED WATER HEATERS
These galvanized water heaters have recovery rates ranging from 107 to 1200 gph. They are available in 13 sizes and are gas or oil fired. Bulletin is available.
Page 147 Item 269

FLEXIBLE EXHAUST HOSE
Made of strong Neoprene-coated cotton or Nylon fabrics spiral-wire reinforced, hose is installed for dust control, particularly at elbows and moving hoods. Information available.
Page 148 Item 270

DIFFERENTIAL PRESSURE CONTROL
This extremely sensitive differential pressure control has hermetically sealed magnetic mercury switch to make or break electrical circuits on small changes in the difference between two pressures. Bulletin is available.
Page 148 Item 271

DESIGN CAPACITY SPRAY NOZZLES
Air-conditioning costs are lowered with spray nozzles designed for exact control of spray characteristics. Complete range of sizes, for washing, humidifying, cooling. Bulletins offered.
Page 149 Item 272

HEAVY DUTY STEAM COILS
Tilted feature of these heavy duty steam coils assures drainage of condensate whether used for vertical or horizontal air flow. Every square foot of face area produces equal heating capacity on full or modulated steam supply. Details are available.
Page 149 Item 273

CONDENSATE PUMPS
Three sizes of cast iron receivers now offer a complete line of low pressure system condensate pumps to fit all requirements. Features include low return connection, low speed and long line. Bulletin is available.
Page 149 Item 274

DIRECT FIRED HEATERS
Stainless steel units, 400,000 to 2 million Btu, gas, oil, or dual fuel, for heating factories, warehouses, hangars, etc., distribute heated air at high velocities direct or through ducts for space or process. New bulletin gives complete specifications.
Page 150 Item 275

COMBUSTION TEST KIT
Complete combustion efficiency test can be made in 30 seconds with this test kit which includes CO_2 draft gage, stack thermometer, smoke gage, slide rule computer, clips, instructions and necessary fittings. Information is available.
Page 151 Item 276

PORTABLE PYROMETER
A wide selection of thermocouples and extension arms assures adaptation to your needs for this portable pyrometer. Eight scaled ranges are available up to 2000 deg F. Bulletin is available.
Page 151 Item 277

TRAINING COURSE
Training in air conditioning and refrigeration is offered under two study plans by a school of mechanical trades. Detailed information about plans is available.
Page 151 Item 278

FORCED DRAFT COOLING TOWER
This manufacturer's jet forced draft cooling tower claims as advantages no corrosion, no rusting, no electrical failure and no failure in efficiency. Information is available.
Page 151 Item 279

AIRBORNE NOISE SILENCER
These silencers have been designed specifically to reduce the airborne noise generated by fans in industrial air conditioning and ventilating systems. They are compact, light weight and acoustically efficient. Literature is available.
Page 152 Item 280

FANS WITH ALUMINUM BLADES
Extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure, and the superior strength of wrought metal. Easily assembled in the tower, fan requires no special handling equipment. Details are available.
Page 152 Item 281

INTERIOR FIRE PROTECTION
Manufacturer's interior fire protection line more than meets specifications. It also meets the highest standards of safety plus design, practicality and economy. Bulletin is available.
Page 153 Item 282

FIXED AIR GAPS
Water contamination is prevented by installation of this company's fixed air gaps eliminating direct connections between water lines and sewers. Available with tapped inlet, tapped or spigot outlet, and standard length with tapped inlet and outlet. Catalog available.
Page 153 Item 283

IN-DUCT HUMIDIFIERS
Honest humidification for real winter air conditioning. Data including details on the product, its application, and how to develop this new business sent without obligation.
Page 153 Item 284

ELECTRIC AIR DUCT HEATERS
For heating air under forced circulation these electric air duct heaters are efficient, economical. Heaters can be installed easily in round or rectangular ducts and accurately controlled manually or by thermostat. Bulletin available.
Page 153 Item 285

DRAFT INDUCER
Money is saved through reduced capital investment, elimination of cost maintenance and complete combustion of fuel with use of the company's draft inducer. Descriptive bulletin is available.
Page 154 Item 286

CENTRIFUGAL ROOF EXHAUSTERS
This company's lo-boy centrifugal roof exhausters enhance the beauty of building skylines. Forward or backward curve wheel within or out of scroll housing. Bulletin available.
Page 158 Item 287

VERTICAL TURBINE PUMP
Installation saves $30,000 annually. Discovery that adequate cold water for air conditioners existed underground led to drilling of well and use of pump to supply 1½ million gal daily. Information on use of pumps in air conditioning offered.
Page 159 Item 288

CONTINUOUS ROOF VENTILATOR
Ventilates thousands of buildings efficiently. In ten sizes from 4- to 42-inch throat size, its contour invites outside air to pull unwanted heat and fumes out. Fully illustrated bulletin offered.
Page 160 Item 289

AIR CONDITIONING EQUIPMENT
A 26 million dollar New York hospital selected the manufacturer's equipment totaling 107 air conditioning units, spray coil units, giant system fans, and unit ventilating sets. Information is available.
Inside Back Cover Item 290

THREE-WAY BY-PASS VALVES
Three-way by-pass valves for liquids are offered by this company. Valves feature in-the-line servicing, straightaway piping, and tight closing design for low installation and service cost. Bulletins are available.
Back Cover Item 291

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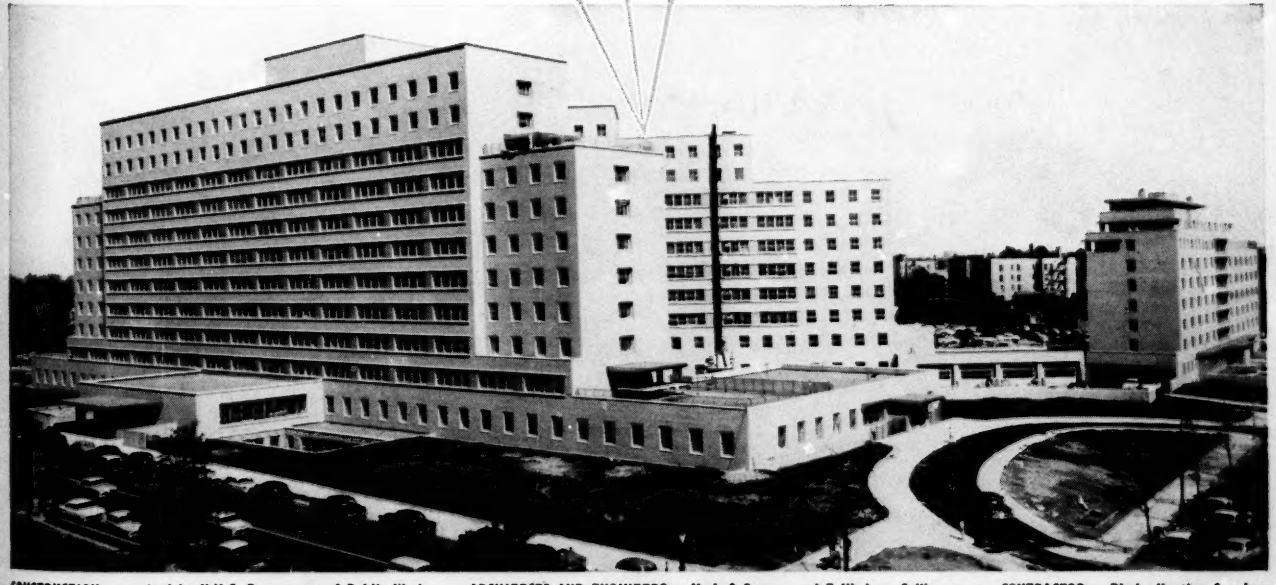

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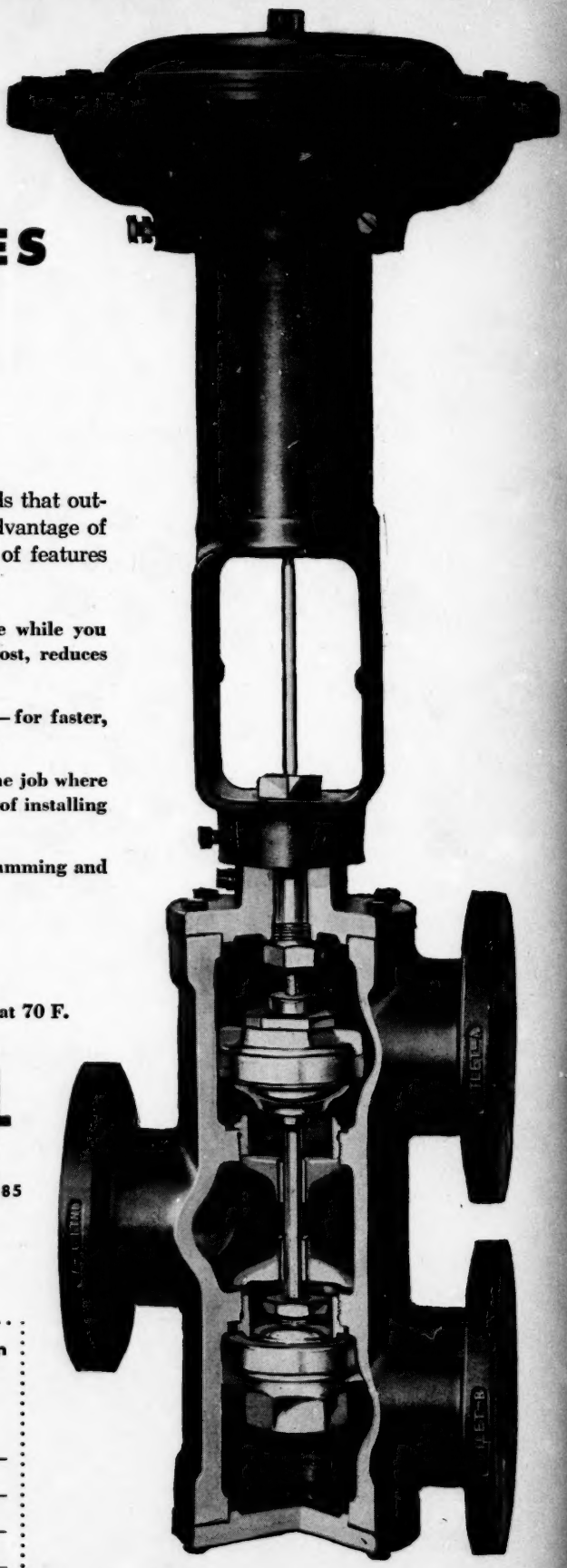

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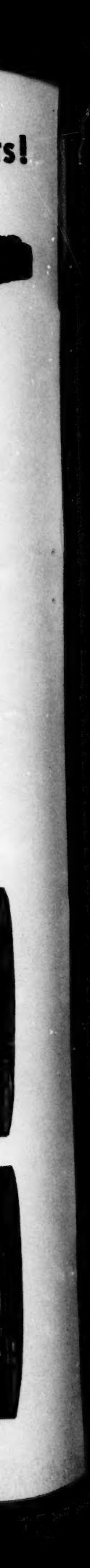
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